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THE WESTERN EUROPEAN EDI MARKET

1990-1995

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Network Services Programme—Europe

The Western European EDI Market, 1990-1995

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Abstract

Electronic Data Interchange (EDI) is defined as the electronic transfer of business transaction information between applications in a structured format conforming to a standard. The trading partners exchanging information invariably have different processors and different data formats, thereby creating the need for translation into common formats and between standards.

EDI is emerging as an area of increased focus and this report examines the development of this strategically important and fast-growing market opportunity in Western Europe. The report provides an assessment of the current size of the market, the strategies employed by the leading Network Services vendors, the market directions for EDI software and the growing role of Professional Services organisations. The market is analysed by individual country with forecasts for major country markets to 1995. The analysis includes an assessment of the major forces that are driving market growth.

The report is 164 pages long and includes 64 exhibits.

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I

Introduction

I

Introduction

A

Background

This report, produced as part of INPUT's Electronic Data Interchange Programme, examines the Western European EDI market, providing an investigation and analysis of European developments during 1990 in this rapidly growing market.

INPUT defines EDI as the inter-organisational electronic transfer of business information between applications in a structured format conforming to a public or a de facto standard. The information can represent standard business documents, such as invoices, purchase orders and logistical information.

This report focuses on the third-party EDI service and software markets and excludes consumer applications such as electronic shopping, electronic banking, automatic teller machine networks (ATMs), point of sale (POS) terminals, airline reservation systems and credit authorisation systems and other "captive" networks which are used for transactions between two parties. Although these systems use electronic "forms" to transfer information, the applications generally use specialised terminal devices to communicate with dedicated computers. They are not computer-to-computer, application-to-application implementations; they use proprietary data formats rather than public standards.

EDI involves the transmission of data in one of several standard formats, with EDIFACT (Electronic Data Interchange For Administration, Commerce and Trade) emerging as the most likely "international" standard. In most instances, data from installed applications are translated to the standard prior to transmission, otherwise a third-party service will carry out on-network translation. It is usually necessary for the data to be translated again into formats recognised by a trading partner's computer

applications. The value of EDIFACT to Western Europe will be considerable, and its widespread use will enable communication across industry borders, thus creating a market for additional interchange applications within and between industry sectors.

Such is the rate of uptake of EDI in Europe that the majority of users are still at an early stage with EDI. However, some organisations are already adding new transactions to those they already handle electronically, whilst a few are looking to integrate EDI functionality with internal applications. The benefits of EDI, when integrated into an organisation's overall business philosophy, are vast and in many cases still totally unexplored. At this early stage in its development in Western Europe, it is, however, already changing the way companies are doing business, with the consequent improvements in an organisation's overall efficiency.

EDI can be configured either point-to-point, directly between trading partners; on private networks among autonomous parts of a group; or through third parties - the Network Services vendors. These firms serve as collection and switching services that perform store-and-forward tasks and other processing (i.e., issuing reports, providing audit trails, etc). In addition to these firms, EDI is providing new lines of business for software vendors and professional service companies as well as helping form pan-European trade and industry associations in many vertical industries. With so many players in the game, the European EDI market is a very competitive environment and the devaluation of telecommunications across Europe is helping to maintain the pace.

Users will ultimately benefit from industry competition through a variety of choices, competitive pricing and improved features, but at present many only perceive the additional costs of implementing new systems and methods. Profitability for vendors, however, remains elusive and is likely to remain so for some time, due to the need to hand-hold and support the host of only semi-convinced "adherents to the new faith."

This report is designed to assist vendors in:

- Identifying new markets and product opportunities.
- Assessing product and marketing risk exposure.
- Allocating research development, and operational resources.
- Gaining insights into future market developments.

The report describes and measures the EDI software and services market in Western Europe in 1990 and presents a forecast through to 1995.

B

Methodology

The research for this report consisted of:

- Vendor interviews with 10 representatives of network services and software vendors.

The questionnaire used is included in Appendix B.

- Discussions with other industry bodies, such as representatives of industry associations, PTTs and common groups.

INPUT also collected and analysed information on EDI software products and training services and reviewed secondary research sources.

C

Report Structure

This report is structured as follows and addresses the following topics:

- Chapter II is an Executive Overview of the entire study.
- Chapter III is a description of the background to European EDI, describing the different types of EDI in use and the role of the key players in the different European countries.
- Chapter IV contains the detailed market analysis, forecasts and opportunities.
- Chapter V is a review of the development forces, issues, and competitive environment in the Western European country markets.
- Chapter VI introduces the INPUT EDI Input-Output Matrix and suggests how it should be used in Europe.
- Chapter VII contains the summary findings on the state of the EDI market in Western Europe in 1990.
- Chapter VIII summarised the likely developments over the next decade and gives recommendations for vendors and users.

Definitions of EDI-related terms can be found in Appendix A. The exchange rates and inflation assumptions are contained in Appendix B. Appendix C contains INPUT's market sector definitions.

D

Related INPUT Reports

This report is one of many focused on EDI; other reports include:

- *EDI Intertrends - North America*
- *EDI Software Product Provider Profiles*
- *EDI Business Integration Issues*
- *North American Service Provider Profiles*
- *Vertical Industry EDI Directions and Potentials*
- *EDI in Professional Services*
- *Network Services in Western Europe, 1990-1995*
- *X.400 and EDI*
- *International EDI Services*
- *Federal Government EDI Initiatives*

II

Executive Overview

II

Executive Overview

A

EDI Services— A Vendor Opportunity to Market True Competitive Advantage Benefits

EDI is set to impact all types and sizes of business and public sector organisations in Europe during the rest of the current decade. Its implementation has the power to enable organisations to seize and retain a competitive advantage vis-a-vis their rivals. Failure to implement EDI could well mean the opposite - businesses and organisations that ignore or reject EDI could be disabled from continuing their activities in the sectors in which they operate.

Defining the boundaries of EDI is problematic. In the strictest definition as used by INPUT, EDI is the computer-to-computer exchange of information between applications belonging to two different autonomous organisations, who wish to communicate with each other. It therefore implies that both the organisations involved in the exchange are computerised. In practice, however, EDI operations may be involved between companies which are not fully in this happy state:

- Manual intervention may take place at one or more points in the chain of communications.

- Business procedure changes may be forced on a reluctant but weaker business trading partner who is not computerised by a stronger client company.

The market in Western Europe for EDI software and service was $50 million in 1990 and this figure is split between:

- Network Services expenditure.
- Software Products.
- Professional Services.

EDI highlights the well-known fact of the heterogeneity of European markets, which appears in so many software and services sectors:

- One country market (the UK) provides a much more favourable climate for the development of an active and open EDI market than any of the others. The UK had just under 50% of the 1990 EDI sector expenditures and this is due to the computing clearing-house service providers.
- A truly open, regional market across Europe requires a uniform and clear-cut vision of a separate market segment and this is by no means the case with EDI in Europe. Different countries for reasons of business culture and different infrastructures are developing along slowly converging paths into EDI.
    - The UK has adopted the independent clearing-house approach.
    - Germany is penetrated with a considerable number of direct, partner-to-partner, communications links run over the private networks of the "senior" partner in the hub of each community. These systems increase the software and professional services components of the market at the expense of the network services portion, much of which remains in-house (or captive).
    - EDI, which is essentially cross-industry in its final implementation and penetration throughout an economy, is now cutting into French industry-based vertical sector communities in which many proprietary network and processing services have a long established track record of success.
- In some of the smaller countries of Europe and among smaller users throughout the region, the exchange of unstructured or semi-structured business information between applications is blurring the boundary between EDI and electronic messaging in a more general sense. Hence the interest among many users and industry associations in the development of the X.400 message handling standard to allow for the particular needs of EDI messages. X.435 will facilitate easier transition between fully-structured, semi-structured and unstructured forms of data as they pass around the discontinuities in the network caused by:
    - Changes in messaging medium
    - Lack of full computerisation at certain user destinations.

For all of the above reasons there is a very variable rate of growth of EDI forecast by INPUT across the different countries reviewed in this report:

- At the low end of the scale, the UK market will grow between 1990 and 1995 at a CAGR of 34% per annum.
- At the top end of the scale, the Spanish market is forecast to grow, admittedly from a very low base, at 83% per annum.
- As shown later, growths in between these extremes are found spread across the range.

Recession has started to spread across European economies. It is most marked in the UK and is affecting countries progressively more adversely as one looks across the region from west to east. The overall effect of recession is to slow down capital expenditure and this has been taken into account in INPUT's forward forecasts. In the medium-term this deceleration in EDI growth will be more than countered by the acceleration caused by users' growing awareness that EDI helps to cut costs.

Exhibit II-1 summarises the overall market characteristics which prevailed at the end of 1990.

EXHIBIT II-1

EDI—The Business Enabler

Key Features in Europe, 1990

- The $50 million market
- European fragmentation:
  - Differing market sizes
  - Different approaches
  - Different environments
- Country growth varies from 34% to 83% per annum
- Recession bites

B

Western European EDI—A $350 Million Market in 1995

The overall market size of the tightly defined EDI market in Western Europe in 1990 was measured at just under $50 million. In actual terms the market has grown by 53% from the $32 million, re-estimated for 1989 as a result of INPUT's 1990 market review.

The market is forecast to grow at a CAGR of 48% between 1990 and 1995, giving a 1995 market in constant 1990 US dollars of $345 million. This market forecast is illustrated in the column chart shown at Exhibit II-2.

During INPUT's 1990 market review, evidence came to light of a slight check to market growth in terms of a weakening of the dominance of the UK sector component. In the UK, users started to experience a significant change in market conditions, when:

- Many pilot projects initiated in earlier years came to an end and entered a forward evaluation phase.
- Large users with large-scale EDI production systems planned passed through a quiet period of lower expenditure prior to the start of implementation of the next phase.

INPUT measures the EDI market in three discrete subsectors:

- Network Services expenditure, comprising network accession subscription fees, message/transaction processing fees and annual subscription renewals reached $31 million or 62% of the market, down from a share of over 70% in 1989 due to the start-up expenditure of large projects outside the UK.
- Software Products, comprising principally one-time licence fees, at $9 million, forming 19% of the market.
- Professional Services, comprising tailored software development, education and training, with $9 million, forming the remaining 19% of the market.

The relative proportions of these three components of the market will remain roughly the same during the period to 1995, after which time the Network Services component will increase its market share as more of the national markets in Europe reach a critical mass of EDI users. This will have the effect of increasing volume-based transaction fees, at the expense of the other components.

During the next five years the Software Products components will grow slightly faster than the Professional Services components. More standard packages will be used for EDI production systems as these products gain in sophistication. Exhibit II-3 illustrates the change over time in the

three-way split in the market. These proportions will be found to vary from country to country (as shown later in Chapter V). The reader should note that only the Network Services element of expenditures is aggregated into INPUT's figures for the Network Applications market as reviewed in INPUT's Network Services Programme. The Software Products and Professional Services elements are aggregated into the overall European market sizes for these Software and Services product groups.

EXHIBIT II-2

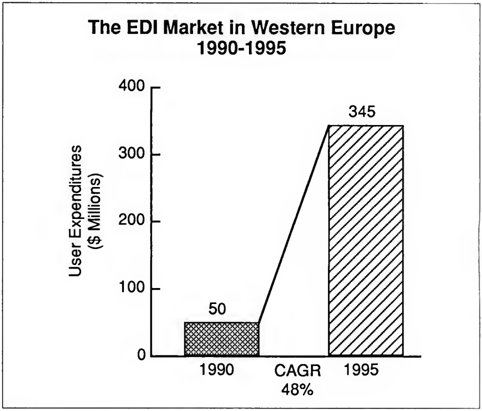
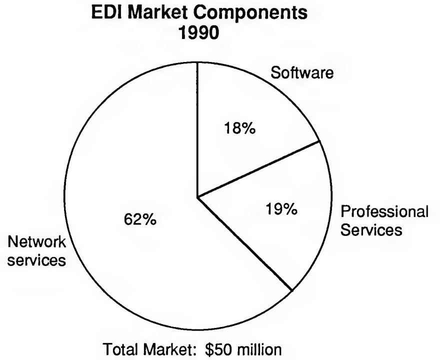
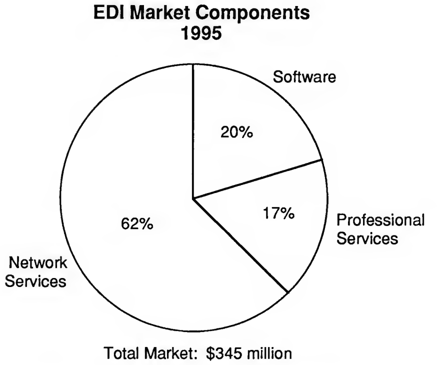


EXHIBIT II-3





Note: Charts may not add to 100% due to rounding.

C

EDI—Associated Sectors

The EDI market is potentially larger than INPUT's figures (defined as we have seen very tightly) indicated because of the following factors:

- EFT, EFTPOS, Electronic Messaging, Fax, Telex and Logistics Systems have a number of areas of overlap with EDI. These overlaps are the consequence of the fact that historically many of the early attempts at inter-organisational application-to-application communication were built on in-house or closed user group message standards. As these systems migrate to the use of international standards, principally EDIFACT, this penumbral area of processing services (which lies adjacent to the EDI sector) will tend to be subsumed into the more general EDI applications market.

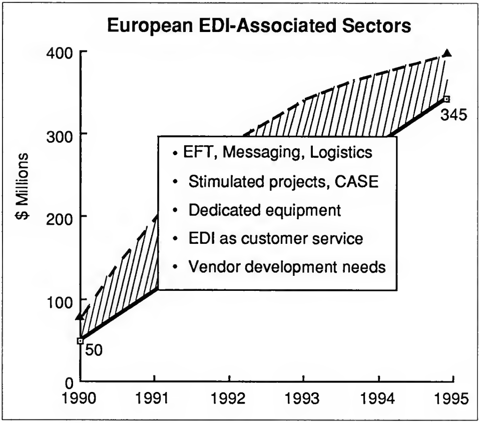
- Users have reported that considerable expenditures have been necessary to upgrade systems to support EDI. This EDI-associated development work presents Professional Services and Turnkey Systems opportunities for Software and Services vendors.

- Computer and communications equipment is excluded from INPUT's EDI market sizing, but new equipment may in many cases need to be dedicated to EDI. The most likely case is where a non-computerised user needs to acquire a micro/PC to support EDI applications that can share hardware facilities with other applications.

- Some companies, particularly in the transportation sector, offer EDI as part of a total customer service. These systems, developed internally or by professional services firms, do not have their transaction processing revenues incorporated in the Network Services portion of the INPUT market sizing.

Accordingly, EDI has the effect of stimulating growth in a whole range of application services because of its strategic effect on the way users conduct their IT development. This "EDI-stimulated" effect is illustrated qualitatively in Exhibit II-4.

EXHIBIT II-4



D

Principal Country Markets

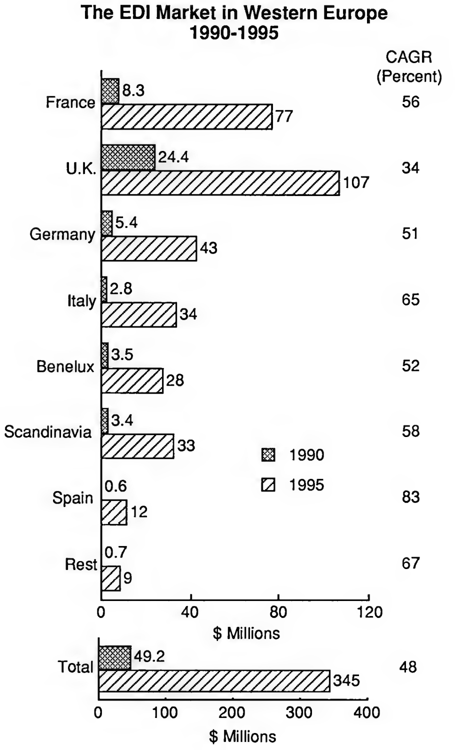
Exhibit II-5 shows the country market analysis of the EDI software and services market in Western Europe in 1990. Forty-nine percent of the market is currently accounted for by the UK sector - down 2% in market share since 1989. The UK market has benefited from the liberalisation of network service provision in the early 1980s following the privatisation of British Telecom and the introduction of competition in the form of Mercury Communications. A series of network applications vendors, notably IBM, GEIS and EDS were attracted at that time by the re-written rules and the promise of potentially profitable investment as value-added traffic was diverted from the national networks onto their systems.

The stage of development of EDI varies markedly from one country to another in Western Europe. Whilst the key factor underlying these differences between countries is the extent of liberalisation of each national telecommunications environment, it is also illustrative of strong national preferences that most of the EDI applications in continental Europe have been done either via direct links between trading partners or within closed sector-based user groups.

France and Germany are forecast to grow at CAGRs of over 50% pa. and to account at the end of the forecast period for market shares of 22% and 12% respectively, although the UK with 34% pa. growth will retain the largest share, but reduced by then to 31%.

Benelux, Scandinavia and Italy will all grow at rates of over 50% pa. to take 8% to 10% market shares in 1995. Spain and the Rest of Europe (Switzerland, Austria, Iceland, Greece and Portugal) are both forecast to grow at CAGRs of over 70% pa., but starting from currently very small expenditures (under $1 million in 1990 in both cases), will take 4% and 3% market shares respectively in 1995.

EXHIBIT II-5


The EDI Market in Western Europe
1990-1995
CAGR (Percent)
France
8.3
77
56
U.K.
24.4
107
34
Germany
5.4
43
51
Italy
2.8
34
65
Benelux
3.5
28
52
Scandinavia
3.4
33
58
Spain
0.6
12
83
Rest
0.7
9
67
1990
1995
0
40
80
120
$ Millions
Total
49.2
345
48
0
100
200
300
400
$ Millions

E

Principal Industry Sector Markets

Exhibit II-6 shows the principal vertical sectors that are active in the EDI software and services market in Western Europe. The manufacturing sector is by far the largest, accounting for almost 60% of the total market, of which Discrete Manufacturing accounts for 50%. This degree of penetration reflects the perceived benefits of EDI in enabling Just-In-Time manufacturing techniques and the consequent improvement in inventory levels.

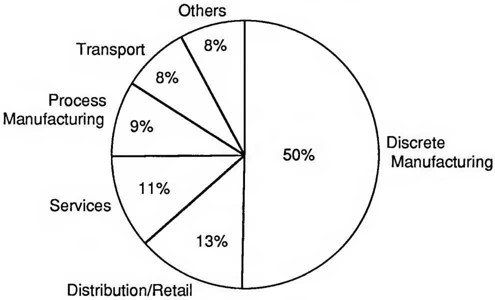
The retail and distribution sector and the business services sector (13% and 11% of market respectively) are also key markets for EDI. The penetration of EDI in these sectors reflects:

- The reach of the large multi-national third-party networks.
- The drive towards improving pan-European communications, evidenced by the number of projects being implemented throughout Europe in the areas of transport, customs and distribution.

INPUT anticipates that the banking and financial sectors will show higher than average rates of growth over the forecast period, as many companies turn their attention to the problems of electronic payments, and as the banks and SWIFT, their international EFT clearing-house, move into the market for general and specific EDI-based services.

EXHIBIT II-6

Western European Vertical Market EDI 1990



Total Market = $50 million

Note: Charts may not add to 100% due to rounding.

F

Identifying Target Sectors

EDI depends upon the formation of trading partner communities. Traditionally many of these communities start life as one-to-many relationships, the well-known "hub-and-spokes" configuration. In the presence and with the assistance of an industry or trade association, these communities can grow into many-to-many relationships at a number of levels:

- At the message standards level, associations aid intra-sector EDI.
- At the transaction/operating level, the trade association needs to enlist the help of a network and/or a service provider to enable day-to-day EDI to happen.

Much EDI in Europe is at this level of advancement. It is still intra-sector.

The next phase of development comes when the third-party clearing-house approach enables organisations to establish EDI between different "hub-and-spoke" or "intra-sector" communities.

Inter-sector EDI is then possible, as long as:

- Each sector can translate to or communicate in a common message standard. Here ANSI X12 or EDIFACT are the only two real alternatives.
- Inter-clearing-house gateways are available to enable users in one sector which is more dominated by one provider to communicate with users in another which has been more highly penetrated by another service provider.

The correct analogy here can be found in the field of Local Area Networks (LANs).

Intra-sector networks are analogous to individual LANs. Just as a "bridge" can connect two separate LAN communities, a clearing-house has the ability to bridge between two sector communities, making each into part of a wider inter-sector community. This stage is now being reached in the USA and the UK.

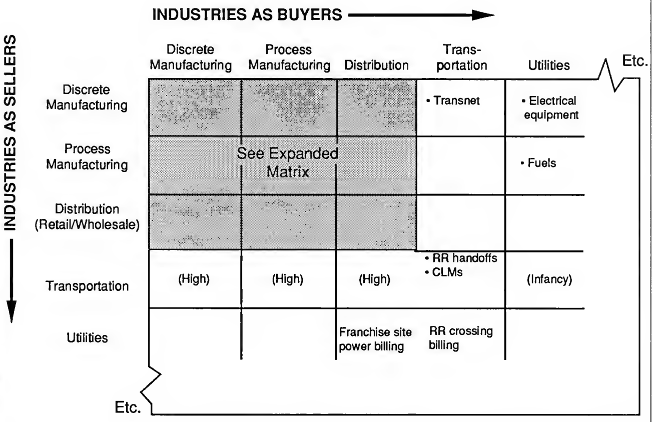
The implications for marketing EDI services then become clear and can be expressed in terms of three crucial questions:

- Which sectors are most highly penetrated and with which services?
- Which inter-sector requirements have most potential or are least well known?
- Where are my competitors focussing their efforts and why?

To assist vendors in positioning their present and future services offerings INPUT has produced the cross-sector Input-Output Matrix, a corner of which is shown in Exhibit II-7. The full matrix, complete so far as is known for the US market, appears in Chapter VI of this report.

EXHIBIT II-7

EDI Input-Output Matrix



INDUSTRIES AS SELLERS ↓ / INDUSTRIES AS BUYERS →	Discrete Manufacturing	Process Manufacturing	Distribution	Transportation	Utilities	Etc.
Discrete Manufacturing				• Transnet	• Electrical equipment	
Process Manufacturing		See Expanded Matrix			• Fuels	
Distribution (Retail/Wholesale)						
Transportation	(High)	(High)	(High)	• RR handoffs • CLMs	(Infancy)	
Utilities			Franchise site power billing	RR crossing billing		
Etc.						

Exhibit II-7 illustrates the principles involved:

- Each sector has two faces:

  -It can be a Buyer industry, operating Buy-Side EDI with its supplier companies.

  -It can be a Seller industry, operating Sell-Side EDI with its major customers.

- The Matrix lays out the main industry sectors and establishes a grid of boxes. On the top left to bottom right diagonal of this grid lie the intra-sector community boxes, from which we expect much EDI activity to stem.

- INPUT or its client companies can then plot, and plan for, the likely market potential in all the other boxes, those which represent inter-sector EDI transactions.

INPUT's user and vendor research for 1991 is targeted to complete the Input-Output Matrix in the major Western European EDI markets.

G

EDI Vendor Recommendations

INPUT finds that the EDI market in Western Europe suffers from a high degree of variability in terms of:

- Infrastructure for networking.
- User sophistication in the use of EDI.
- Current national market size and growth rates.

For this reason we cannot yet speak of a truly homogeneous regional market for EDI, although EDI is a principal driving force in the creation of the single European market.

The user experience of EDI brings him to a realisation of his requirements for a series or range of services. The normal progression of his awareness is:

- "There is a need for someone to provide a network" - the first Network Services requirement.

- "There is a need for me to get to know about how to implement EDI" - there is a Training and Education requirement here.

- "We shall need some software and help with getting this going - I may need some hardware as well" - there are opportunities for Software Products, Professional Services and Turnkey Systems at this stage.

- "I must now decide who is going to provide me with the communications facility - which clearing-house or provider do I go to?" - the Network Services vendor starts to reap his major investment reward from here on.

- "Has this project been successful? Do we want to extend it into other, more complex operations, perhaps? Where do we go from here? How do I avoid any past mistakes?" - the opportunities start to accrue to a whole range of service approaches:

    - Project evaluation consultancy.
    - Application integration studies.
    - Software evaluation and procurement.
    - Application development.
    - Facilities management and systems integration.

Vendors operating in the EDI market will broadly speaking, be able to provide three groups of service:

- Network Services, including start-up software facilities.
- Software products and their maintenance.
- Consultancy, training and project integration capability.

Vendors must focus their offerings by three dimensions:

- Services type.
- Industry sector or sectors.
- Target country markets.

Vendor background and size will normally limit their degree of freedom in the first and last of these dimensions:

- Only large vendors will be able to offer the whole range of services.

- Only the larger vendors will be able to pick and choose their country markets; for the smaller ones the domestic market is all, but they too must look to overseas markets if they are not going to be swamped on their home ground.

Vendors should institute a review of their EDI offerings going through the following steps:

- Determine the services focus - normally determined by the company background - software company, consultancy or manufacturer.

- Decide on industry sector focus using the INPUT EDI Input-Output Matrix.

- Determine the level of sophistication of each target country market. This will influence the appropriate service portfolio to be marketed.

- Re-assess your service focus options by country - if this is possible, ie. this applies to major vendor companies only.

- If your service focus does not match requirements but is necessarily restricted, select other industries or countries until a suitable fit is achieved.

INPUT's recommendations are summarised in Exhibit II-8.

EXHIBIT II-8

Vendor Recommendations

- Recognise market variability
- Understand the user maturity cycle
- Decide on your further focus:
  - Services type
  - Sector
  - Country

III

EDI and Related Application Areas

III

EDI and Related Application Areas

A

Background

This chapter provides a background overview of EDI in the context of its European development and describes the various types of EDI implementation. It discusses the different EDI services and software as well as examining the important relationship between EDI and related applications. Finally, the development and important future role standards will play in a healthy European market is touched on.

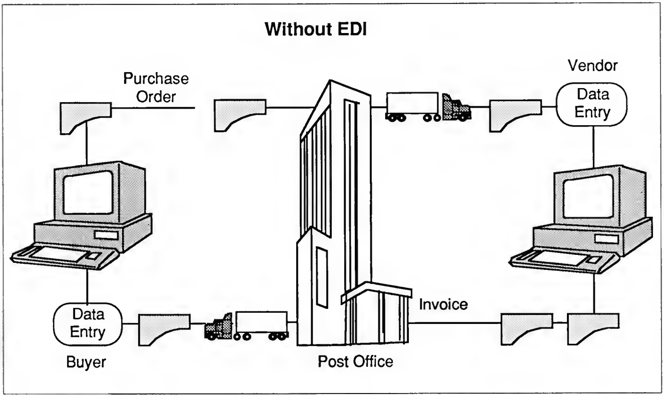
Most European organisations have installed computer systems to support routine business operations and computer applications to prepare business documents such as purchase orders, invoices, shipping instructions and payment authorisations which are then printed and sent to suppliers, customers and banks. Alternatively, the telephone may be used to take orders or relay information such as status reports and shipment tracing enquiries. Exhibit III-1 shows the situation which exists before EDI is implemented.

Many large companies use electronic means to transfer data to dependent suppliers, sometimes by physically shipping computer tapes or diskettes. With the increasing use of communications networks to transfer this information, two significant problems emerge which can inhibit the growth of easy migration to a system of paperless electronic trading.

- Data transfers between dominant companies and their dependent suppliers often require the weaker trading partner to accept whatever format the larger company provides. This situation can force a supplier to accept a proprietary standard, with the penalty being the potential loss of business.

- This arrangement can place burdens on suppliers' programming resources, especially when a supplier must comply with the requirements of many customers.

EXHIBIT III-1



B

Reasons for Using EDI

Computer-prepared information forms a database that can be used for a variety of corporate management applications, including budgeting, accounting and forecasting, and creates benefits for many corporate departments beyond the buying and selling functions. In other words, the adoption of EDI can totally change the way a company carries out its business, if the implementation is viewed and managed strategically.

The "traditional" ways of preparing and managing business documents have inherent problems, the most often cited being that:

- Paper or verbal information is not directly usable by computers.
- Telephone ordering and order-taking are labour intensive and error prone.
- Reliance on the postal service slows turnabout time.

Furthermore, many companies hold safety stock to meet unanticipated needs. Whilst this improves customer service, such safety stock can lower the ratio of annual turnover of stock, thus reducing a company's business rating. EDI enables Just-in-time (JIT) inventory techniques to be used more easily, reducing stock-holding without reducing the level of service to the customer.

Excluded from INPUT's definition of EDI are "dedicated" applications such as electronic shopping, Automatic Teller Machine (ATM) networks, point of sales (POS) terminals and airline reservation systems. Also excluded are real-time, interactive, on-line order entry systems, Electronic Mail and other similar applications.

- Arguably, these systems use electronic "forms" to transfer information; however, these applications generally use specialized terminal devices to communicate with dedicated computers, and are not generalized, computer-to-computer, application-to-application implementations.
- They also tend to use proprietary data formats, and are interactive rather than batch oriented.

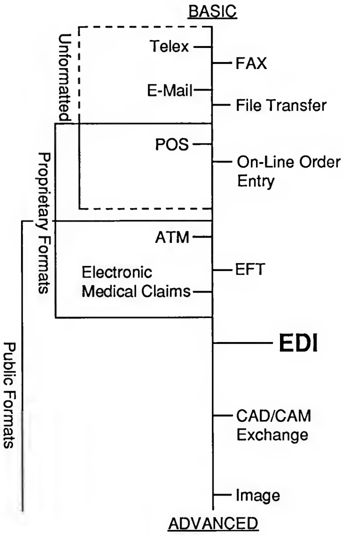
These other forms of Inter-Organizational or Inter-Enterprise Systems are valid and valuable applications of information technologies, and are part of a continuum of which EDI is a part (Exhibit III-2). However, INPUT has chosen to focus on a restricted definition of EDI, believing that it represents an optimisation of a technique for routine business communications.

EDI commonly involves the transmission of data in one of several standard formats, with the American National Standard Institute's (ANSI) X12 the emerging dominant North American standard, and the UN's EDIFACT finding long-term favour in Europe.

- Application data is translated to a standard format either prior to transmission, or by a third-party service.
- The data is translated again into formats recognized by a trading partner's application, with the data elements mapped to the locations and sequences required by the receiving data bases.

EXHIBIT III-2

The Electronic Messaging Continuum



In the past, EDI efforts have been implemented using private standards.

- Commonly agreed upon standards such as TRADACOMS, EDIFACT and ANSI X12 are now being used, with adaptions, by many industries.
- The use of standards allows communications across industry lines, thus paving the way for additional information interchange applications.

There is evidence of EDI activity in virtually every industry sector. The largest users are found in the discrete manufacturing, distribution, and transportation industries, with other users in the auto making, grocery and consumer goods, warehousing, electronics, chemical, metals, paper, office supplies and drugs industries.

The reasons for using EDI include the time value of information, cost avoidance, better inventory control, and other benefits derived from integrating EDI data with corporate information processing.

EDI also fulfills two key criteria for businesses and organisations considering the implications of the Single European Market:

- Firstly, that information management can be a competitive tool,
- Secondly, that a successful EDI installation will satisfy the requirements for increased productivity by permitting reduced storage, transportation and administration costs.

The impact of EDI is greatest in those sectors where customer service, as opposed to quality, price or design, is the key differentiator. EDI provides an immediate reduction in the time from placing an order to receiving the goods, and the subsequent improvement gives immediate advantage. EDI can obviously have an indirect impact on price and quality as well, but such benefits are not easily defined.

EDI is also playing an important role in the development of "Just-in-time" manufacturing, which has important implications for manufacturers and suppliers alike. Automotive manufacturers, for example, have been able to place more stock control responsibilities on suppliers.

Reasons for using EDI are summarised in Exhibit III-3.

EXHIBIT III-3

Why Use EDI?

- Reduced expenses
- Fewer errors
- Faster turnaround
- Improved customer service
- Enhanced management control

C

Approaches to EDI Networking

EDI networking can be handled in several ways: point-to-point, directly between trading partners; on private networks; or through third-parties - Remote Computer Services (RCS) or Value-Added Network Services (VANS). VANS and RCS vendors serve as collection and switching services, and may offer a number of other services.

A company's computer system can directly link to another company's. However, there are some basic problems with this direct, one-to-one solution.

- The computers, communication methods, and information (data) formats may not be compatible.
- Direct links can be inefficient and costly, with scheduling, contention, and other network management problems.

Adding to these problems are complex business relationships. Companies do business with multiple business associates, often across industry segments. This can lead to a very complicated business environment, as shown in Exhibit III-4.

Despite this complexity, several major companies are using direct or private network implementation of EDI, but often in combination with third-party network EDI mailbox services.

EDI works to overcome many of the problems of direct company-to-company communications by providing conventions or standards, for inter-company linkage.

- The EDI transaction standards define the data ("document") formats to be used.
- While there are few communications standards, protocols or line speeds mandated for EDI, use of a value-added network can overcome even these differences. Trading partners can agree independently on what communication methods to use.

Several networking alternatives are available:

- A company may implement a private EDI network system. Larger companies, with their own internal networks, sometimes take this approach.
- Third-parties, such as a value-added network service (VANS) provider or a remote computer service (RCS) vendor, can provide mailbox store-and-forward services, as well as conversion, translation and integration services.

- A third alternative, which is similar to the third-party network approach, is an industry association clearing-house. Galion - the service for the French distribution sector - is an example of this approach.

Third-party networks and industry clearing-houses, which are more frequently encountered in the USA, are described in INPUT's North American EDI Service Provider Profiles report.

EXHIBIT III-4

Comparing Three Systems

	EDI	E-mail	On-line Order Entry
Communications Characteristics	Computer-to-computer between applications	Person-to-person	Terminal-to-computer
Documents	Purchase orders, invoices, bills of lading, shipping notices, etc.	Textual messages	Orders and inquiries
Public Standards	ANSI X12 EDIFACT	CCITT X.400 CCITT X.435 CCITT X.500	Typically terminal emulation
Providers	Third parties-to-trading clusters for intra- and inter-industry use: Corporate IS-to-trading partners (large companies)	Third parties (intercorporate) Corporate IS (intracorporate)	IS and marketing departments

D

EDI Software Solutions

Users subscribing to VANS or RCS services may rely on software hosted on the vendor's processors to perform data format translations, or may internally translate private or application-specific formats to standard formats prior to transmission. This latter approach is less expensive over time and is the dominant trend.

Users can write their own EDI software or purchase it.

- If purchased, customisation and interfacing to internal applications by the software vendor, a professional service vendor, a consultant, or the user's own development staff are usually required.
- EDI software should be closely linked ("mapped") to existing applications to optimise its usefulness. Otherwise, a company may have to print out received EDI transactions and re-key the data, losing efficiency.

E

Relationships Between EDI and Other Application Areas

1. Electronic Mail (E-Mail) and EDI

E-mail is defined as person-to-person communications, usually in text. It can be computer-based, facsimile, or telex. EDI is application-to-application communications, in machine-readable form.

While E-mail can be used to transfer machine-readable binary files, such as spreadsheet data, INPUT does not consider this use as EDI, since the transfer is not in a public or de facto standard.

Like routine paper-based mail, E-mail is used for transferring business documents.

E-mail can be used for EDI-like applications with form-creation options supporting order entry, inquiries and other documents. However, these documents are not generally in machine-readable form.

E-mail and EDI do complement each other. For example, E-mail is useful in the negotiations that precede an EDI business relationship.

E-mail forms systems and services can serve as low-volume EDI-like networks ("Poor Man's EDI"). They provide users with a starting point for EDI as volume grows, and create a migration path for both users and E-mail service providers.

2. EDI and On-Line Order Entry Systems

To support telemarketing functions, many companies have installed automated systems allowing sales and customer service agents to query a data base regarding product availability, shipping status and the like, and to electronically enter orders.

Often these systems are opened to customers, allowing direct electronic access to the information. This, in effect, transfers data entry from supplier to customer. Although a PC may be used, it is often in terminal emulation. Some suppliers provide their customers with software to facilitate this activity. However, while the intent is similar, on-line order entry systems are not "true" EDI.

3. EDI and Electronic Funds Transfer (EFT)

Buying and selling relationships involve inquiring, ordering, bidding, shipping, and similar activities. The process culminates with a monetary exchange.

While EDI is the transfer of information regarding the first set of functions, Electronic Funds Transfer (EFT) is the transfer of monetary value.

Financial institutions have several mechanisms for transferring value among themselves and on behalf of their customers. Several formats have evolved to integrate payment information with the dominant ANSI X12 EDI standard. Value transfers (without information) will likely decline in relationship to EDI/EFT transactions.

Several third-party service providers, as well as several banks, have introduced services to bring the buy/sell EDI relationship full cycle with payment services in association with the transfer of EDI data.

4. EDI and Logistics

Logistics information refers to the location of materials in transit to or through the manufacturing and distribution process.

Three third-party services can provide logistics information to shippers to help plan and optimise their production and distribution schedules. Several transportation carriers also provide this variety of EDI on a customer service basis.

This information can be provided as railroad car location messages (CLMs), truck location/availability data and Shipper's Administrative Messages (SAMs) for several modes of transportation, and other messages.

Optionally, this form of EDI, known as logistics data interchange (LDI) links into Just-in-time (JIT) inventory management, material resource planning (MRP II), and similar applications.

INPUT groups purchasing, EFT/EDI, and logistics EDI into a single category called "Mainline" EDI, stressing its cross-industry common applicability.

5. Other Forms of EDI

EDI can also use a variety of industry-specific applications, such as in health-care, insurance, property and loss assessment. Other professional variants are being explored by some industry and national EDI associations.

F

Relationships Between EDI, Data Bases and Internal Applications

A corporation's business applications reside between the data base and any EDI function. Incoming EDI messages are the basis for data base entries. Items retrieved from the data base are often used to issue outgoing transactions.

There are several data bases within a typical corporation that are most likely to interface with EDI. Certain applications lend themselves to integration with EDI software, such as order processing, accounting, shipping and factory management systems.

G

Relationships Between EDI, JIT and MRP

Just-In-Time (JIT) is a factory management concept that works to minimize inventory levels. In a JIT environment, production is order-driven; only enough finished product is kept on hand to meet the needs of actual orders received.

A JIT system enhanced with an EDI module speeds purchase order processing by improving the interface between customer data and internal applications.

On the supplier side of a manufacturing facility, a materials management system assures that only enough parts and materials are purchased to produce the specific number of finished products already ordered.

Materials Requirements Planning (MRP) is linked to the outside world via the purchasing department. The EDI purchase order becomes the key document in such a system.

A so-called MRP II system (Manufacturing Resource Planning) is a broader concept linking factory management systems to other corporate systems such as shipping, accounting, or financial planning. There is an opportunity to introduce an EDI module wherever these systems interface with other trading partners for the exchange of shipping notices, invoices or other electronic documents.

IV

Market Analysis and Forecast

IV

Market Analysis and Forecast

A

Introduction

Electronic trading of one sort or another will account for a substantial part of the business transacted by large companies and organisations by the end of the forecast period. There is a confluence of factors that indicate fast growth of EDI expenditures:

- The proliferation of computer systems,
- Third-party and tele-marketing techniques,
- Automated service offerings,
- Cheaper software,
- A growing recognition of the emergence of EDI as a way of doing business,
- EDI's benefits and its relevance to the development of the single European market.

The market assessment and forecast given below for the Western European EDI market was developed from evaluation and analysis of both current and projected activity on the part of users and vendors.

The market assessment is provided for 1990 and forecast over a five-year period until 1995. INPUT's market assessment is of end-user expenditures. Forecasts are made in local currencies for individual country markets and converted into US dollars for purposes of aggregation and comparison.

The US dollar exchange rates used in conversion of local currency market values are shown in Exhibit B-1 (see Appendix B). These rates were the average exchange rates in May 1990. The forecasts are expressed in current rates; consequently allowance must be made for the rate of inflation. The inflation assumptions made by INPUT are shown in Exhibit B-2, which is also found in Appendix B.

B

Aggregate Market Growth

The EDI market has been researched and measured as a set of component products, which can then be aggregated to form the total market size:

- Network services, which include at the basic level access point maintenance, error correction, protocol and speed conversions, switching, interworking through gateways, and store-and-forward services. These services are typically provided by third-party service providers' networks, although private and public networks may provide many of these elements.

- Additionally, third-party networks will also provide the associated EDI processing services, such as data field validation, data format translations, standards conversions, as well as directing the transmission of electronic transactions, which have been submitted electronically in batch mode, to their individual destinations, covering also the cases of multi-point transmissions ie: to more than one destination.

- Software for translating data between EDI standards and to handle communications and communications software associated with EDI transmissions.

- Professional services for systems design, software customisation, equipment selection and acquisition, systems integration, facilities management, education and training.

The aggregated market growth projection is given in Exhibit IV-1, which shows a 48% compound annual growth rate (CAGR) through to 1995. A breakdown of the three EDI market components in 1990 is shown in Exhibit IV-2.

EDI is anticipated to continue demonstrating a spectacular growth rate since the various inhibitor forces (standards, software, networks, cost) are being outweighed by the driver forces spurring the industry forward:

- There is an increasing realisation that EDIFACT represents an opportunity to speed up the progress in standardising message formats, while at the same time developing initiatives in specific industry sectors. ODETTE in the automotive industry, CEFIC in chemicals, EDIFICE in electronics, the EEC's Single Administrative Document (SAD) for import/export, have all produced early versions of standards applicable to their sectors. It is now possible using EDIFACT syntax to develop these industry standards in ways which ensure compatibility with the common messages, which will emerge centrally from the EDIFACT committees;

- The availability of relatively inexpensive standard software packages for interfacing internal applications to EDI services has opened up the EDI market to smaller companies which will never be able to afford mainframe or mini computers, but are able to perform EDI transactions on a micro;
- Thirdly, the spread of telecomms innovations. Liberalisation across Europe means that other European countries can now benefit from the type of network services which have been available in the UK for over five years. Third-party service providers fulfill an important role in the market, bringing to bear an ability to interconnect EDI users within and across vertical market sectors.

EXHIBIT IV-1

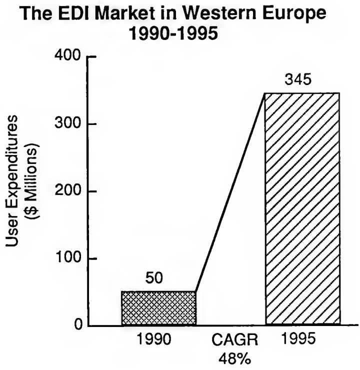
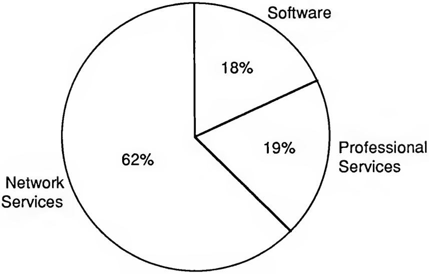


EXHIBIT IV-2

EDI Market Components
1990



Total Market: $50 million

Note: Charts may not add to 100% due to rounding.

C

Forecast Reconciliation

Exhibit IV-3 shows the differences between the current forecast and INPUT's 1989 EDI forecast in the report entitled, *EDI Intertrends Western Europe 1989-1994*.

The 1989 market was marginally undervalued in the 1989 report (by 6%). This was due to a number of small discrepancies in measurement across several country markets.

The future growth rates forecast in this report have been reduced over those used in last year's report due principally to two factors:

- The slow-down exhibited by the world economy during 1990, which INPUT expects to continue as a recession well into 1992.
- The move from a stage where many stand-alone, pilot-type, EDI projects are being implemented to a new phase where many large organisations are turning to full-scale EDI production-level projects, which require careful planning and design at the initial stage.

Growth remains high, however, for the following reasons:

- The market is scarcely penetrated to a level above a fraction of one percent of organisations and in some countries is starting from a very low base.

- The large number of pilot projects currently in operation throughout Western Europe is now starting to move on to full EDI implementations with the consequent need to involve software, hardware and professional services vendors in systems integration projects.

- Use will continue to grow in step with user experience. Additional transactions to be implemented by users and uptake of facilities by their trading partners will account for steady transaction volume growth.

- Private EDI implementations will become fully open with integrated gateways opening between private and public services, placing more user expenditures in the available non-captive market.

- Integrated EDI software from the major mainframe software vendors and EDI add-on modules from independent sources is becoming available, typically from IBM, Digital and Hewlett-Packard.

Towards the end of the forecast period a contrary trend will tend to counter the higher growth tendency:

- User expenditures are expected to moderate even though transaction growth will continue at high rates. This will be as a result of competition between vendors which will lead to price cuts, so depressing user unit expenditures per transaction.

- Discounting will increase as higher volume transactions occur.

EXHIBIT IV-3

Forecast Reconciliation

1989 Market			1994 Market				
1989 Report ($M)	1990 Report Sizing ($M)	Variance as Percent of 1989 Report Forecast	1989 Report Forecast ($M)	1990 Report Forecast ($M)	Variance as Percent of 1989 Report Forecast	1989-1994 CAGR Percent in 1989 Report	1990-1995 CAGR Percent in 1990 Report
30.2	32.0	(6)	270	228	(16)	55	48

D

Western European Market

The total market for EDI software and services provided by third-party providers, ie the non-captive market within Western Europe, is anticipated by INPUT to have reached $50 million in 1990 and to grow at a compound annual growth rate of 48%, reaching a total of $345 million by the end of 1995, as illustrated in Exhibit IV-1.

The majority of the EDI software and services market comprises network services, with 18% of the market attributed to EDI software products and their maintenance and with the balance of 19% held by professional services and systems management projects (see Appendix C for INPUT's full set of services definitions). This is shown in Exhibit IV-2.

INPUT anticipates that the network services sector will continue to represent the largest slice (62%) of the total EDI market throughout the forecast period, with the software and other services share also remaining level as the market stabilises along pan-European lines. The steady growth of EDI over the forecast period is illustrated in Exhibit IV-4.

Exhibit IV-5 shows the overall analysis of the EDI software and services market by individual country or country group markets. A more detailed discussion of these individual country markets is provided in Chapter V of this report. In 1990 the UK held just under 50% of the total European market. By the end of the forecast period two-thirds of the market is expected to be held by the three largest economies in Western Europe, the UK (31%), France (22%) and West Germany (12%), with Italy and Scandinavia each holding 10%. Exhibit IV-6 illustrates the shift in market shares by country between 1990 and 1995.

Exhibit IV-7 provides a detailed year-by-year breakdown by individual country of anticipated user expenditures by individual market between 1990 and 1995.

The comparative vertical market sector analysis is shown in Exhibit IV-8. The benefits of EDI in reducing administration costs and in improving stock control and customer service is reflected by its take-up in the manufacturing, retail, distribution and transportation sectors of the Western European market, where these benefits are most easily realised in the improvement of the costs associated with transactions with external trading partners.

Exhibit IV-9 gives the detailed breakdown of the 1990 EDI market by industry segment. INPUT forecasts that the highest growth will be experienced in the manufacturing sector as industry invests to contain production costs in the face of increased European and international competition and in the distribution and transportation sectors where the implications of the single European market will be felt most acutely. A useful amount of growth will also start to be seen in the Health Care, Government and Financial Services sectors.

EXHIBIT IV-4

Western European EDI Software and Services 1989-1995

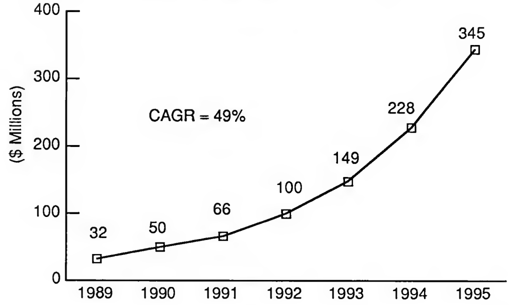


EXHIBIT IV-5

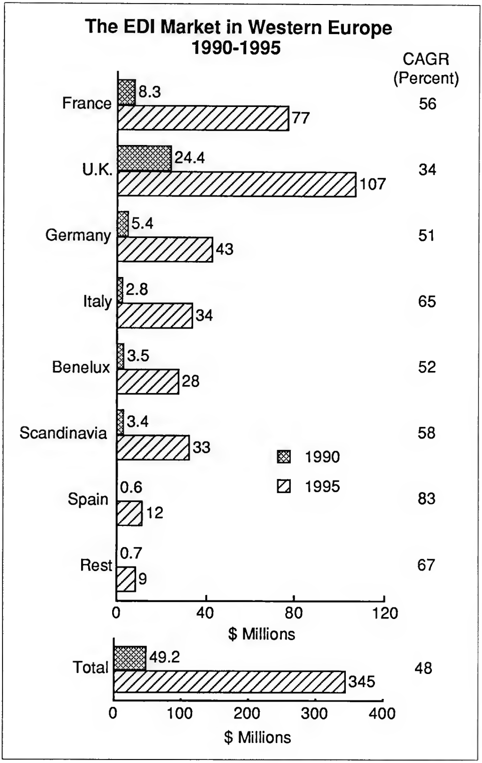
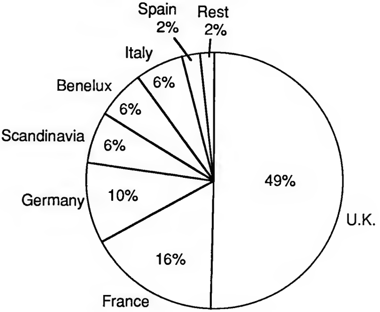

The EDI Market in Western Europe
1990-1995
CAGR (Percent)
France
8.3
77
56
U.K.
24.4
107
34
Germany
5.4
43
51
Italy
2.8
34
65
Benelux
3.5
28
52
Scandinavia
3.4
33
58
Spain
0.6
12
83
Rest
0.7
9
67
1990
1995
0
40
80
120
$ Millions
Total
49.2
345
48
0
100
200
300
400
$ Millions

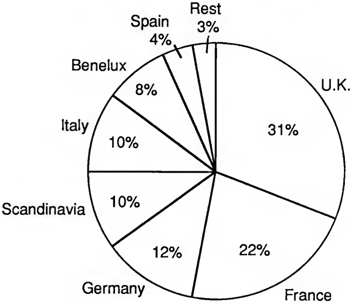
EXHIBIT IV-6

Western European EDI Software and Services Markets by Country, 1990



1990 Market: $50 Million

Western European EDI Software and Services Markets by Country, 1995



1995 Market: $345 Million

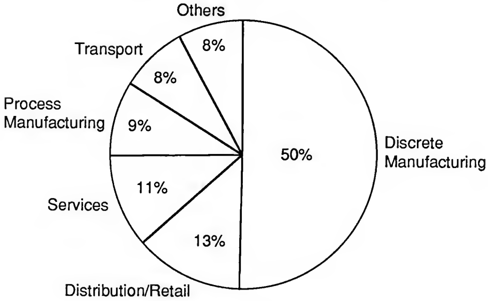
Note: Charts may not add to 100% due to rounding.

EXHIBIT IV-7

Western European EDI Software and Services Country Markets, 1990-1995

Country	User Expenditures ($ Millions)						
	1990	1991	1992	1993	1994	1995	CAGR (Percent)
France	8	12	19	32	53	77	56
U.K.	24	30	40	56	78	107	34
Germany	5	8	12	19	28	43	51
Italy	3	4	7	12	20	34	65
Benelux	3	4	8	12	19	28	52
Scandinavia	3	5	7	11	16	33	58
Spain	<1	1	2	3	6	12	83
Rest of Europe	<1	1	3	4	8	9	67
Total (Rounded)	50	66	100	149	228	345	48

EXHIBIT IV-8



Western European Vertical Market EDI 1990

Total Market = $50 million

Note: Charts may not add to 100% due to rounding.

EXHIBIT IV-9

Western European Industry Segment EDI Expenditures, 1990 ($ Millions)

Vertical Sector	France	U.K.	WG	Italy	Benelux	Scandi-navia	Spain	Rest	Total
Discrete Manufacturing	4.4	11.8	3.8	1.6	0.8	1.4	0.5	0.4	24.7
Process Manufacturing	0.2	3.6	0.3	0.1	0.1	0.1	-	-	4.5
Transportation	0.5	0.8	0.5	0.4	1.2	0.8	-	-	4.1
Utilities	0.2	0.5	0.2	0.2	0.3	0.1	-	-	1.5
Telecom-munications	0.5	0.2	-	-	0.3	0.1	-	-	1.1
Distribution (Retail)	1.8	2.0	0.5	0.3	0.6	0.7	0.2	0.2	6.3
Banking (Financial Services)	0.2	0.1	-	-	-	-	-	-	0.3
Insurance	0.2	0.3	-	-	-	-	-	-	0.5
Health care	-	0.3	-	-	-	0.1	-	-	0.4
Education	0.1	-	-	-	-	-	-	-	0.1
Services	0.2	4.7	0.1	0.2	0.2	0.1	-	-	5.6
Government	-	0.2	-	-	-	-	-	-	0.2
Other	-	-	-	-	-	-	-	-	-
Totals (rounded)	8.3	24.4	5.4	2.8	3.5	3.4	0.6	0.7	49.2

E

Competition

The leading vendors in the EDI software and services market are listed in Exhibit IV-10. This is based on the INPUT estimates of the revenues that were gained by vendors in 1990 and also shows the equivalent market shares.

INS (the ICL/GEIS joint venture) continues as the market leader due to the success of its Tradanet network in the UK. GEIS trading in its own right appears in second place helped by the reach of its network across Europe and its positioning as a service provider offering international and European coverage. Istel, another UK-based network services provider, is in third place due to its strong presence in the manufacturing sector.

The top 10 vendors accounted for 87% of the market.

Caution should be exercised when drawing conclusions from the lower end of the rankings since positioning is highly dependent on the placing of implementation contracts and the position of closed user groups. EDS, for example, is still building the continent-wide EDI network for its parent company General Motors, which is designed to link computer systems in seven countries, using networks such as Istel in the UK, Transpac in France, GEIS in West Germany, Italy, Spain and Benelux. Once this network is set up, EDS would like to sell capacity on it to other commercial users.

EXHIBIT IV-10

Leading Vendors—Western European EDI Market

Rank	Vendor	1990 Anticipated EDI Revenues ($ Millions)	Market Share * (Percent)
1	INS	13.7	28
2	GEIS	9.8	20
3	Istel	6.8	14
4	IBM	3.9	8
5	GSI	1.9	4
6	SD-Scicon	1.8	4
7	EDS	1.5	3
8	Bull	0.9	2
9	Transpac	0.7	1
10	Hewlett-Packard	0.5	1
	Others	7.7	16
	Total	49.2	100

Note: May not add due to rounding.

V

Market Environment

V

Market Environment

A

Development Forces

1. Western European Network Environment

Any type of structured transfer of data between trading partners and their computers is a form of EDI. If electronic communication is little more than an accelerated postal service, it reduces lead times but provides little inherent added value. The real advantage of EDI is that if a communication is structured then it enables both the initiator and the recipient to automate the interface between communications and their own internal business procedures - be they manufacturing, administrative or distributive. When companies go down this road, there is immediate and significant potential for unit cost reduction as well as for reductions in response time to market requirements.

As Western Europe moves towards more international trading, fully integrated networks linking voice and data communications to the business use of data processing, to office automation, to building controls, to process control and other types of networks will be combined through a mixture of private bypass and public switch (virtual) networks to provide a complete capability for network communications within each industry sector and between them. This overall evolution is summarised in Exhibit V-1.

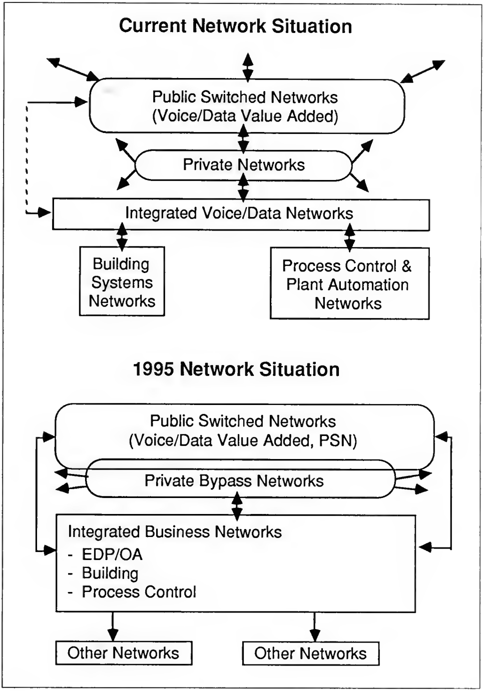
Currently, the existence of a large number of private and single industry EDI networks is working to retard the market by slowing acceptance of standards, limiting trading relationships, and excluding potential participants - in all to a failure to reach a critical mass from which to accelerate forward.

However, this situation is likely to change during the forecast period, 1990-1995, and this change can be put down to three major factors, which are causing an increasing shift toward a fuller commitment to network technology and systems in Europe.

- Liberalisation of the public telecommunications network.
- Blurring of the boundaries between data processing, office automation, telecommunications and control systems technology through the common use of network-orientated microprocessor-based systems.
- The growing dependence on and commitment to the network as a framework for conducting business.

This changing structure of the network systems application and use across the major Western European industrial market segments indicates the growing commitment to, and use of, networks and network technology involving both private organisational networks and the use of public switched services.

EXHIBIT V-1


Current Network Situation
Public Switched Networks (Voice/Data Value Added)
Private Networks
Integrated Voice/Data Networks
Building Systems Networks
Process Control & Plant Automation Networks
1995 Network Situation
Public Switched Networks (Voice/Data Value Added, PSN)
Private Bypass Networks
Integrated Business Networks
- EDP/OA
- Building
- Process Control
Other Networks
Other Networks

However, organisations are turning increasingly towards a new class of supplier: one which can offer a broad integrated array of network systems based services for design and engineering, data processing and installation, maintenance and repair. Such an organisation must be equipped to provide both voice and data services on a single application or on an integrated basis and must be capable of constructing the most efficient utilisation of both private network equipment technology and the

public switched network services. The customer is suggesting that service is more important than the product technology, and thus a service strategy can increasingly pull through product sales.

A network-based service portfolio for integrated design, installation and maintenance services, as a strategic line of business can offer significant revenue and profit potential on its own and as a mechanism for generating product sales and public switched network service sales. This new strategic focus and positioning requires a carefully constructed portfolio of services at pricing levels reflecting different levels of service commitment and delivery for each individual market segment, horizontal or vertical.

Such a network service strategy can be adopted in different ways:

- By the deregulated PTTs.
- By the network and processing services arms of the major equipment suppliers such as IBM, Digital and Bull.
- By the major multinational networks such as GEIS, Infonet and EDS, who are already offering service catalogues containing network systems integration and service support as a line of business.

EDI will play an increasingly important part in this type of strategy.

2. Critical Mass

Growing use of EDI in Western Europe will lead to increased opportunities for professional services firms as well as hardware, software, turnkey and communications vendors.

Smaller companies need to be included in EDI services as they often create more expense in suppliers' order processing than larger companies, in relationship to order size.

Additional computing and communications equipment and software will be more often needed by smaller companies to take advantage of EDI services and to meet the requirements of major trading partners for suppliers with EDI capabilities. The growth of microcomputers for EDI implies increasing demand for EDI software at this level of platform.

For the financial and operating benefits of EDI to be realised, a critical mass of trading partners is crucial, for it is only when this stage is reached that the paper system overheads can be reduced. INPUT's user research has indicated that many larger organisations have addressed this requirement (for critical mass) by forcing suppliers to adopt EDI. In

some cases, the smaller organisation in the relationship has been ill-prepared for the changes proposed and often resentful of the context of their implementation.

Because there is pressure on vendors and users alike to attain critical mass as soon as possible in order to realise the economic benefits associated with EDI, there has been a mismatch between the services marketed by the service providers and the potential user's ability to see or exploit any benefit, especially in cases where they cannot see any value added to current business processes.

This situation is rapidly changing as critical mass is approached and as vendors and large users use a more consultative approach to those who are sitting on the fence. This has resulted in a more mutually beneficial approach, certainly in the long-term, where the emphasis is placed on education, with benefits highlighted and analysed. In France, the UK and Germany over the past year, pilot projects have continued as the means:

- Of verifying the operation of the interface between existing systems and the EDI link.

- Of turning the new operating cycle.

Within the context of the Single European market, EDI has an important role to play:

- In supporting competitiveness, by furthering economies of scale and rationalisation.

- In promoting cooperation agreements in the developing international arena.

Where pan-European networks are in place and in sectors where critical mass has been achieved, EDI provides a common business practice which transcends national, geographical and cultural barriers. This can only provide companies that have already adopted EDI with considerable competitive advantage.

3. Standards

a. EDIFACT

Most European countries have trade facilitation bodies formed by major shippers and related service and government agencies. Exhibit V-2 lists these organisations.

However, one of the problems with standards development is that different parties have differing needs. Each industry or large user has certain unique requirements that must be considered in the standards development process. Consequently, there can exist subtle variations even in the basic standards that have to take into account factors such as special billing requirements, differing measurements and different shipping instructions.

EXHIBIT V-2

Trade and Standards Facilitation Bodies

Country	Organization	Address/Phone
Belgium	Siprocom	Office Belgique du Commerce Extensive World Trade Center Boulevard E. Jacqmain 162 B-1000 Brussels (32-2) 2194550
Denmark	Danpro	NC Andersens Boulevard 18 1596 Copenhagen V (457) 152233
Finland	Finpo	FFTA Arkadigatan 4-6B 00100 Helsinki 10
France	Simprofrance	61 rue de L'Arcade 75008 Paris (33 1) 42-93-03-02
	Edifrance	c/o AFNOR, Tour Europe cedex 7 92049 Paris-La Défense (331 4291 5621)
Italy	Italpro	Ministerio delle Finanze Studi della Legislarime Piazza Marconi 25 00144 Rome
Netherlands	Sitpronetm	Nederlands Nomalische-Imtbrit Postbus 5059 2600 GB Delft (31-15) 611061
Sweden	Swepro	PO Box 450 40127 Gottenberg (46-31) 637277
Germany	Devpro	Bundesministerium für Wirtschaft Postbox 140 260 5300 Bonn (49-228) 6151
UK	Sitpro	Almack House, 26/28 King St. London SW14 69W (44-1) 930-0532

This situation often leads to lowest common denominator standards and duplicate transaction sets covering the same type of electronic documents, but with different formats. This problem could be compounded in Europe where each country could develop national standards, industry-specific standards and private EDI standards.

Until 1987, the international standards under development were called General Trade Document Interchange (GTDI), endorsed by a United Nations Committee and having evolved from the UK's Trade Facilitation Board. An even earlier co-ordinator of various industry and international groups was called the Joint Electronic Data Interchange Committee, known as JEDI.

JEDI's activities were superseded by the UN Economic Commission for Europe's Working Party on Facilitation of International Trade Procedures, which is responsible for the agreed international standard making process known as EDIFACT (EDI for Administration, Commerce and Transport). The structure of the West European EDIFACT board is shown in Exhibit V-3.

EDIFACT encompasses the capabilities of the US ANSI X12 standards and provides additional functions for international use. In late 1987, the ANSI X12 committee endorsed the efforts of the UN committee and started a process to bring US EDI standards into synchronisation with international standards. A syntactical framework has been approved by the International Standards Organisation (ISO) and two basic message types have been approved by EDIFACT. The provision of a message syntax ahead of full approval of a range of message formats enables trade, industry and national EDI groups to go ahead and design their own message sets in the knowledge that they will be basically compatible with the eventual standard messages issued from the centre. In this way later migration to the international set will be made less painful.

Exhibit V-4 shows EDI standards and their relationships, with the intersections representing the degree of compatibility. Note that the shaded outer circle in the referenced exhibit represents the X.400 standard. This international messaging standard is likely eventually to encompass the subspheres of EDI by placing the EDI messages within the X.400 "envelope."

INPUT believes that multiple standards will not in themselves represent a significant technical impediment to the development of international EDI. Standards supporting international trade are increasingly available, and the work of the UNECE is proceeding fairly rapidly. Furthermore X.400 is being developed by CCITT under an accelerated procedure to accommodate the requirements of EDI. This work is being done under the standards X.435 (protocol requirements) and F.435 (service and operational requirements).

The UK, with an installed user base of around 3,000 users, leads the rest of Europe, whose user base stands at less than 2,000. In continental Europe, where the EDI market is less mature than in the UK or Scandinavia, many companies are attempting to move straight to EDIFACT. This, however, in view of the need to develop messages using the EDIFACT syntax, is slowing the development of the EDI market.

EXHIBIT V-3

Structure of EDIFACT Board

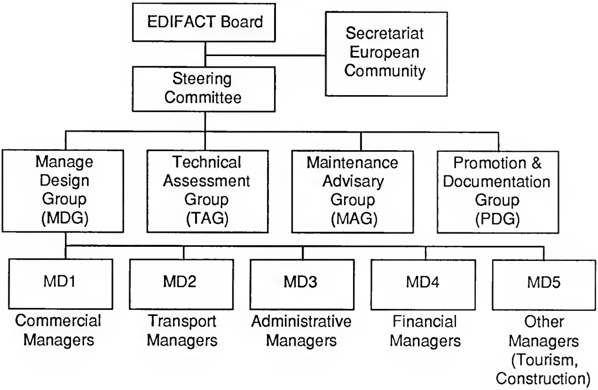
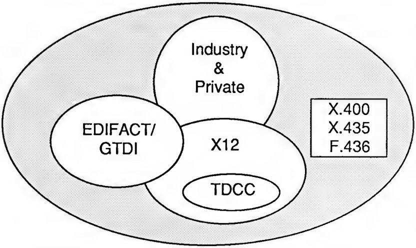

EDIFACT Board
Secretariat European Community
Steering Committee
Manage Design Group (MDG)
Technical Assessment Group (TAG)
Maintenance Advisary Group (MAG)
Promotion & Documentation Group (PDG)
MD1
Commercial Managers
MD2
Transport Managers
MD3
Administrative Managers
MD4
Financial Managers
MD5
Other Managers (Tourism, Construction)

EXHIBIT V-4

EDI Standards Relationships



The inevitable lack of co-ordination between individual European countries will continue to present opportunities for the international US companies, GEIS, EDS and IBM. By not being associated too strongly with any one European country they can avoid getting entangled in any nationalistic undercurrents which may influence the member states of the European Community. The history of not being allowed to operate their own circuits has made then into experts at negotiating the obstacle course of cross-border telecommunications within Europe. Most importantly at this stage of EDI market development, they cater for the multi-nationals, precisely those who are pioneering pan-European EDI.

b. X.400

Many EDI users in France, West Germany and Scandinavia have opted to use public EDI services rather than exchange messages directly, for three basic reasons:

- There is no single protocol accepted by all users in the industry.
- The cost of operating direct communication networks under any of these protocols is high.
- Many companies are reluctant to connect their host processors containing their organisational database information directly to communications networks.

When using a public service, the end user establishes a single session with the service provider and sends EDI interchanges for multiple trading partners and then retrieves all interchanges sent by its trading partners. The service provider acts like a post office by sorting the interchanges and placing them into mailboxes for specific trading partners. In this way, an EDI user has to call the public service only once or twice daily to perform all EDI functions.

In 1984, the X.400 Message Handling Standard was approved by the International Telephone and Telegraph Consultative Committee (CCITT) as a standard that would allow incompatible electronic mail systems to exchange messages.

X.400 is a high-level communications protocol that specifies how messages are exchanged between two computers and is part of the growing trend towards Open Systems Integration (OSI). Exhibit V-5 shows the OSI Reference Model, which identifies the seven levels of communications and computing systems. X.400 functions at the seventh level of the model, whereas the protocols operated directly by most EDI users function at lower levels.

X.400 will add two very important capabilities to electronic messaging networks. Firstly, it provides reliable transport of messages between different message systems, complete with an electronic audit trail. Secondly, it enables a worldwide directory of electronic mail users to evolve via its companion X.500 directory standard (which is so far not fully developed).

EXHIBIT V-5

OSI Seven-Layer Reference Model

7-	Application	High-Level Applications like E-Mail	Application	-7
6-	Presentation	Protocol Translations	Presentation	-6
5-	Session	Coordination of Sessions	Session	-5
4-	Transport	Transfer of Files across the Network	Transport	-4
3-	Network	Transfer of Bits across the Network	Network	-3
2-	Links	Transfer of Bits over a Connection	Links	-2
1-	Physical	Physical Connection	Physical	-1

Because X.400 can substantially increase the intelligence of communication among different electronic mail services and different media (fax, telex, etc.) it was realised that X.400's benefits can be extended to EDI. In September 1988, the International Telephone & Telegraph Consultative Committee (CCITT) formed the X.435 committee to create the modifications to X.400 that will allow it specifically to handle EDI documents.

X.400 is a powerful communications protocol that is being used by today's public service providers and large users to ease the path of users into EDI. X.400 will improve with time through audit trails, user source authentification, security procedures and consignee notification, all of which features will also facilitate international EDI.

X.400's main benefits can be summarised as follows and are illustrated in Exhibit V-6:

- X.400 serves as a reliable gateway, so that mail systems from different vendors and using different media can exchange information in a standardised environment.
- X.400 enables companies to communicate with customers and suppliers without forcing everyone to use the same mail system or without compromising internal security.
- X.400 allows companies to develop private networks that link computers from multiple vendors.
- X.400 allows companies to plan and implement messaging systems on a decentralised basis across different networks without compromising compatibility by placing more intelligence in the network nodes.
- X.400 possesses the capability of evolving into a single network architecture for a wide variety of non-interactive business applications, including personal messaging, document distribution, funds transfer, database information transfer, financial planning and spreadsheets transfer, and of course, EDI.

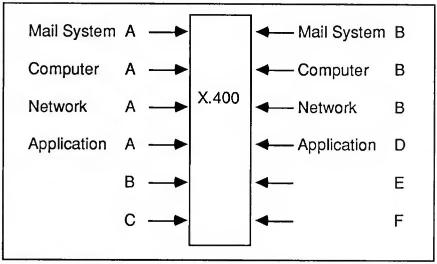
To many communications companies and certain EDI users, X.400 will solve what is perceived as a growing problem associated with EDI interconnectivity especially among unsophisticated users. On the other hand many organisations already involved in EDI have no perception of a problem and thus there is no consensus as to X.400's relative value.

EDI's present ad hoc method of communication works well for most users. X.400, however, must be viewed as a long-term communications technology that will eventually become a worldwide standard and is of generic importance in encouraging the coverage of E-Mail and EDI. As if to stress this, it is worthwhile noting the computer and communications

organisations that have implemented X.400. These include: IBM, GEIS, Digital, Bull, INS, Data General, Hewlett-Packard, AT&T, BT Dialcom, France Telecom (Transpac), Deutsche Bundespost Telekom, and Telenet; all are either marketing X.400 products or have implemented X.400 in their electronic mail services.

EXHIBIT V-6

X.400 Benefits
A Gateway Between Different Systems



4. Cost Benefits

According to INPUT's US user research, savings due to EDI may be as much as $40 per transaction cycle (order, acknowledgement, delivery note, invoice) over paper-based systems. More importantly, the time taken for the order-to-invoice cycle can be cut from around 14 days to 3 days, generating significant savings in stock and improvements in cash flow.

However, substantial savings for all organisations from EDI will not occur until a higher proportion of the total document processing load is sent via EDI, and linked subsequently to EFT by electronic payments systems. This is not to say that significant cost savings cannot be achieved in the short-term and there are many examples of large organisations eliminating the need to re-key huge numbers of invoices on a daily basis.

However, EDI's benefits are not restricted to cost saving. Improved cash flow, improved stock control and improved management information and business enterprise control are the key benefits to be kept in mind. Thus far, the beneficial impact of EDI has been the direct and planned one.

However, future, more indirect effects will include reducing information overload and functional skills transfer as well as the natural decentralisation that is slowly occurring in some organisations. Early adopters of EDI who have reaped the straight rewards of cost reduction are now creating new trading structures, which will result in significant managerial benefits.

5. National Versus International

The major obstacle to pan-European EDI is currently the division of Europe into countries (the twelve EC member countries, the EFTA bloc and the newly-awakened Eastern European market). The various European countries have adopted their own approaches to EDI without co-ordinating their activities with their neighbours. Whilst the UK actively promotes EDI to produce ease of import and export of electronic data, Germany, for example, has sustained protectionist measures aimed at prohibiting foreign suppliers from gaining a dominant position in domestic markets.

There are now over three dozen groups working on EDI message sets in Europe alone. The sort of reason being given for this state of affairs is that the needs of a company trading in high volume consumer goods, for example, are completely different from a company engaged in international distribution.

Whilst EDIFACT is intended to supersede other standards, promising universal compatibility for EDI users worldwide, at the moment it is still underdeveloped and the majority of existing users are keen to protect their investment in the existing formats. The solution in the UK is a peaceful coexistence. With Tradacoms being the most usual standard for domestic trade and 90% of trade being contained within the UK, at this stage all that is required is for Tradacoms to continue as the standard for domestic transactions and EDIFACT to be used for international communications.

6. Industry Associations

These associations have been a prime driving force in the pan-European development of EDI. A listing of the major groupings is given in Exhibit V-7.

Members of an industry association - usually competitors - work together to define the messages required, using whatever is available internationally in so far as syntax and message standards are concerned. This work is carried out by development groups, along lines which reflect the different sectors of industry.

However, in many industries across Western Europe, EDI can best be described as in the pilot phase, for example, the construction industry. Whilst several individual companies and market segments have gone beyond this stage, they are still using a limited number of transaction types and few have fully integrated EDI with other applications such as accounting, cash management, inventory control and shipping related functions. This latter phase is now starting among the large organisations.

As a result, whilst growth will be substantial over the forecast period, INPUT believes that cross-industry optimisation of their systems will be achieved by the majority of industries now active in EDI late in the forecast period and beyond.

EXHIBIT V-7

EDI Activity Found in Most Industries

Format Subset	Industry Segment
ODETTE	Automobile Manufacturing
CEFIC	Chemicals
EDICON	Construction
EDICONSTRUCT	Construction
EDIFICE	Electronics
EMEDI	Medical
TRADACOMS	Retail
EDITRANS	Transport
DISH	International Trade & Transport
SEDAS	Consumer Durables

B

Issues

1. Security

EDI's growth may be hampered by the issue of security. Business messages are inherently confidential and companies are cautious about linking their computers to external systems.

Whilst network/data security was given the highest rating in INPUT's 1989 user research this concern is not shared by vendors and INPUT does not consider security to be an issue that will dog EDI's development in

the same way that the standards issue has, except in determining the attitude of the banks to the adoption of EDI. There are adequate security procedures available (encryption, authentication etc.) which are already applied to networks carrying high-value funds transfers, for example.

INPUT considers that there are three elements to be treated when evaluating the security of an EDI implementation:

- The communications link.
- The systems and procedures used for transmitting and receiving at each end of the link.
- The interaction between EDI systems and in-house systems.

These should each be measured in terms of physical, technical and contractual security.

2. Legal

The risks in EDI transactions include transmission errors, faulty data, failed communication, unauthorised disclosure to third parties, interception during transmission and transmission to the wrong parties. Consequently, vendors must compare the legal implications of replacing paper documents, a medium which enjoys a long history of support under the law as the carrier of legal validity, with EDI, a new, electronic medium, the status of which is not well defined in the law.

There are questions about who is liable for transmission errors and as a consequence the topic is receiving increased attention from associations, standards committees and vendors, because the legal uncertainties could inhibit the EDI market. EDI uses technology to form a business contract that has a high level of legal content, so it should have commensurate attention paid to it by the legal authorities.

So far there is no case law providing guidelines for how to structure legally enforceable EDI transactions. To compensate for the fact that EDI transactions are paperless, some EDI users have negotiated written "trading partner agreements" to preauthorise the EDI transaction and set terms and conditions.

General and IS managers should:

- Be educating legal departments about EDI technology.
- Monitor legal developments.

- Review internal procedures and trading agreements with an interdisciplinary team of technical, managerial and legal experts.

An important part of the trading partner agreement is to spell out who is liable when something goes wrong, but apportioning liability - among trading partners, network service providers and software vendors - gets more difficult as the transactions become more complex and the number of third parties increases. Under the provisions of negligence law, errors in business transactions must be fixed quickly after they are discovered or the liability goes up dramatically. Consequently, it is unwise to leave EDI systems running unattended. E-mail provides the correct medium for control of the EDI process.

3. Management Issues

EDI changes the relationships between organisations and their trading partners, having the effect of shifting the functions between suppliers and their customers to the advantage of the more powerful partner. Usually, this development proves beneficial to both parties (reduction in stocks, better control of distribution, improved production planning and control), but can also have the effect of reducing the presence of a supplier, which in turn reduces the number of sales opportunities available.

Whilst there are organisations, Marks & Spencer in the UK being a perfect example, who have traditionally been in a position to impose their wishes on their trading partners, most companies need to educate their suppliers and sell them the benefits of EDI. This can be the most important component in the whole EDI implementation programme.

Users are being required to adopt new ways of looking at information flows, to recognise the value of information and acknowledge the competitive advantages EDI can provide. Whilst EDI obviously entails more responsibility for the IS department, it can also provide general management with the opportunity to introduce other organisational changes, because the adoption of EDI means a change in the way a company does business.

Most large organisations, and in particular those with a range of EDI applications, have appointed a manager with specific responsibility for the introduction of EDI, its promotion within the organisation, the identification of priorities, and the co-ordination of all EDI activities.

Any organisation considering EDI needs to prepare itself adequately. Major strategic applications have to be endorsed and advocated by senior management directly affected by the area of application. The "EDI manager" should be looking to create awareness about EDI, to establish priorities and allocate resources accordingly and most importantly, provide a focus of EDI expertise and support.

Where the introduction of EDI reduces the numbers of staff performing functions closely related to the handling of paper documents - data entry, telephone enquiry staff, post room staff - the issue needs to be handled carefully as there is a danger that lack of information and inadequate preparation can exacerbate the situation. In the early stages reductions in staff will not be high, with only 17% of user respondents reported as laying people off.

The technology must not be viewed as a solution in itself. Senior management must be prepared to advocate and administer organisational change. This change comprises changes to business and working practices, job functions, manning levels, organisational infrastructures and the information flows.

INPUT believes that EDI, because it imports external influences and, more crucially, because it cuts across internal functions and departments, is likely to have considerable impact on an organisation's infrastructure and overall system development methodology. INPUT will return to this theme in its next round of user research in network services.

4. Pricing Trends

After standards, tariffs are the next most important area for attention. Although the European Commission has been reluctant to comment on this subject area, it is undeniable that there are some large discrepancies on national tariff structures within the Community.

The Commission's sensitivity is understandable, since the tariff structures of the local PTTs often reflect their perceived role as a major provider within society generally. Thus, in Germany, where the Bundespost's long distance charges are notoriously high, this is accepted as a reasonable way of providing cheap local services to the general public and also of indirectly supporting the German postal system by cross subsidy from the DBP's monopoly revenues.

Similar situations exist in several other EC member states and long distance revenues still constitute an overly large proportion (around 30%) of the total telecomms service revenues.

The main stumbling block is finding an accurate way of equating tariffs to costs. Network access and depreciation charges are necessarily different in different parts of the Community, because of varying operating conditions. For the moment, the Commission seems content to let individual PTTs reform tariffs under the momentum of their individual liberalisation programmes and there is evidence that in countries such as Germany, where the DBP finally abolished its unpopular volume-related charges for some categories of leased lines, local PTTs are willing to make their own reforms without risking intervention from Brussels.

If by 1993 this laissez-faire attitude has not produced the desired results however, the Community can resort to its bank of different legislative measures, and it would probably not be difficult to show that a local tariff structure was impeding the operation of the single market.

5. Interworking

Companies tend to predominantly use one network, a situation that is likely to hamper cross-industry EDI transfers since trading is then generally limited to companies on the same service. An alternative is to have multiple arrangements, but this requires maintaining several equipment and software settings to accommodate communications on different networks and, depending on volume, may also require multiple dedicated lines.

However, the third-party service providers are increasingly implementing agreements between themselves and have gateways to other domestic or international packet-switched networks.

- INS and Istel
- Istel and IBM
- Transpac and Infonet
- Seva and Istel

Such connections are needed for inter-network transfers and for the third-party service providers to offer a full service to customers. Furthermore, these interworking enhancements will prove that considerable advantages exist in using third-party networks instead of private EDI systems, enabling them to differentiate their service solutions.

C

Competitive Environment

1. Network Services

The network ("third-party") service providers offer EDI network management services, protocol/speed conversion, error correction, data validation, format translation and store-and-forward services. Service providers operating in Western Europe include:

- Large multinationals, such as:
  - GE Information Services (GEIS) and its joint venture with ICL, INS
  - IBM's Information Network and its various joint ventures throughout Europe, Axone in France, Intesa in Italy, DanNet in Denmark
  - EDS

- European-based players such as:

  - GSI
  - Seres
  - Istel, now owned by AT&T

- The PTT-linked organisations such as:

  - Transpac in France
  - BT Tymnet from the UK.

However, INPUT believes that the network services providers are currently better positioned than the PTTs to benefit directly from EDI growth for the following reasons:

- Their networks extend throughout Europe, are cost-effective as communications links and are already providing processing services to many of the industries currently engaged in EDI.

- The third-party providers have mature, widely dispersed marketing organisations and are able to offer international capabilities either through a European presence or through arrangements with foreign networks.

- Third-party networks' EDI services have been endorsed by industry associations, enabling them to capitalise on their product development leads.

The third-party providers will experience significant EDI growth up to 1995 as the earlier problems of lack of awareness and the high costs of implementation are no longer so significant. Nonetheless, due to the initial low volumes, and high start-up, market education and sales costs, INPUT estimates that third-party EDI profitability will only be reached by market entrants some four to five years after service introduction.

As a true pan-European market develops, more competitors will enter the EDI market, notably the PTTs and the banks, and as a consequence, price competition will intensify, unless each type of vendor can establish a lucrative market position which doesn't overcrowd the sector. Following on from this, whilst a network infrastructure provides vendors with an opportunity to maximise margins, EDI in itself will not justify the capital costs of network development. Although network capacity will become more easily leased (in the deregulated telecommunications environment), this alone is not sufficient to ensure profitability by allowing for added value to be introduced into a multi-layer situation.

Service providers are having to deal with four critical issues:

- Overhead start-up costs.
- Pioneering market development.
- Perceptions about service provider viability.
- Lack of critical mass.

Vendors need to be looking to increase transaction volumes by promoting EDI through its user base with training, technical support, newsletters, seminars and the development of user groups. Vendors should also be looking to develop their commercial relationships with software and turnkey vendors by forming marketing agreements. Istel in the UK has been notably active in this area, within and outside Europe, and now claims over 100 systems using its Edict software.

With many organisations coming to grips with what fully integrated EDI potentially represents, network service providers have an ideal opportunity to benefit from their experience over the past three years. With many organisations still tending to favour "one-stop shopping", a full service position will reap benefits in terms of developing customer base and customer loyalty. The type of service likely to be required in the near future will be a pan-European service including financial services, electronic mail and or facsimile conversion as well as graphics in the manufacturing sectors with CAD/CAM interfacing with EDI to enable design, specification and blueprint exchange between trading partners. The third-party service providers' role in EDI is summarised in Exhibit V-8.

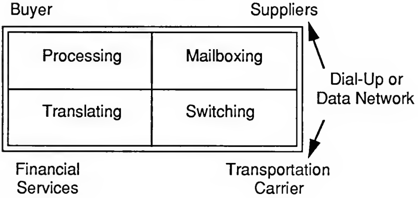
2. Software

At its lowest level, EDI software is a translator that converts data between internally used formats and those required by a trading partner, or between internal formats and agreed standard formats.

As the EDI market develops on a European and international scale, these formats are those which have been approved by a standards body such as ANSI X12 in North America, Tradacoms in the UK and EDIFACT in Europe. A translator will convert data into an industry-specific format, (Odette, for example, in the automotive sector).

EXHIBIT V-8

Third-Party Service Provider's Role in EDI



EDI software often addresses the multiplicity of communications protocols and user requirements in Western Europe by the inclusion of an associated communications module that handles network links for data transmission and mailbox access through private or third-party networks. EDI gateways are now being advocated by the equipment suppliers to support the many application systems within the user's organisation, to facilitate the future path in integrating EDI systems and in migrating from one generation of application to another.

An EDI Gateway assembles all the separate software packages for the individual networks under the control of a high level document router application in order to:

- Accept data from any of the applications and pass the data, via the appropriate application interface, to the target network.
- Pass the data received from the various networks to the correct application. Effectively the gateway uncouples the EDI function from the internal applications.

The other major manufacturers are now following the example of Digital whose VAX/EDI product pioneered this approach. VAX/EDI includes an applications interface, EDI standards translator, communications component, user/supervisor interface and systems manager interface. Digital launched DEC/EDI, a more comprehensive second-generation product in August 1990.

The EDI network services providers have been selling their own and other vendors' packages. In the UK the Interbridge package has proved successful for both INS and Istel. In continental Europe on the other

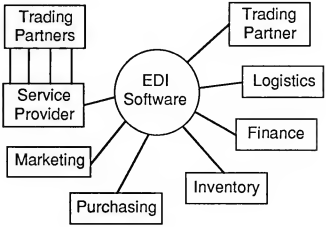
hand software development has taken the form of tailored projects, for example, the Allegro project in France, undertaken by Seres, the joint venture between Bull and Sesa.

The essential characteristic of the Western European software market at this early stage is that it remains small and fragmented. There are no clear market leaders, although SD-Scicon, GLI, and Perwill are three software vendors who have demonstrated an impressive understanding of what the market requires. The end of 1990 saw the recession biting hard on some of the smaller software companies. Compument of Lancaster in the UK went into receivership and some of its products are now being supported and marketed by SD-Scicon. The crucial importance of EDI software is illustrated in Exhibit V-9.

The EDI software market will benefit from the establishment of commercial agreements between service providers and software firms, with the objective of integrating EDI into other applications, and the continuing presence of software vendors in the standards-making bodies and EDI associations. This will ensure that the process of migration from industry-specific or national standards to EDIFACT is carried out by upgrading current users smoothly using software translation techniques wherever possible.

EXHIBIT V-9

EDI Software Is Central to the System



3. Professional Services

In Western Europe, a trend in the development of EDI is for many large users to see a need for professional services to assist in the customisation of EDI software and to integrate systems. Professional Services assistance aids the user in those cases where there is an applications backlog at many user locations.

As a result, although end-user expenditures for EDI professional services only formed a small part of the overall EDI market in 1989, INPUT found from its 1990 research that the market for EDI-related professional services will grow at a compound annual growth rate in excess of 45% over the forecast period, due principally to the growth in EDI-related tailored software development, consultancy and education and training.

Software development, which constitutes the largest market segment, includes: user requirements definition, systems design, database design, programming, testing and debugging, system modification, system customisation, documentation and procedures. The key activity currently is in writing application interfaces between EDI translation software and existing business applications.

The consultancy category includes software installation planning, computer systems audit, and security audit as well as personnel issues. The key activity currently is the examination of the results of EDI pilot projects implemented by large organisations with a view to the development of integrated production projects, perhaps centred on the use of a standard gateway product.

Education and training relates to the whole range of training required, from the analyst/programmer up to the management level. Although this segment is the smallest of the three, its importance cannot be underestimated since it provides vendors with access to user management and an opportunity to highlight the overall value of EDI as an integral part of an organisation's systems infrastructure.

Users are looking to optimise the benefits of EDI by extending the application across multiple department lines. Already in Western Europe, companies such as Seres and GSI in France, GLI and Software AG in Germany, and Perwill and SD-Scicon in the UK are taking responsibility for developing the system from project design to implementation, co-ordinating the three key strands - computing, telecommunications and software.

There will be increasing difficulty, as the West European EDI market develops, in clearly defining what constitutes an "EDI professional services project" as EDI implementations lead to further end-user expen-

ditures in areas directly, or indirectly, linked to EDI. This will interface strongly with user IT strategy studies and with their CASE implementation programmes.

Exhibit V-10 lists the type of companies that INPUT anticipates will be providing EDI-related professional services. Currently, the network service providers, computer equipment manufacturers and software firms are offering EDI professional services. As a pan-European network and standards infrastructure unfolds, the market for professional services will expand and fragment as multi-national and national organisations seek to position themselves by rapidly incorporating the new technologies and techniques associated with EDI. For this reason, the professional services firms, the independent consulting forms, the "Big 6" accounting firms and the banks will take a more significant role. So far notable by their absence from the EDI scene are the RDBMS vendors such as Oracle, Ingres and Sybase.

EXHIBIT V-10

The Western European EDI Professional Services Market

- Network service providers
- Computer equipment manufacturers
- Specialist software product companies
- Professional service firms
- "Big 6"
- Independent consultancies
- Trade associates
- Industry groups
- Banks

As critical mass builds in Western Europe, a professional services project will constitute the following key elements:

- Conduct a cost/benefit analysis, prepare an EDI-project proposal and implementation plan.
- Evaluate and recommend delivery modes.

- Develop and implement education and training programmes for the "EDI community" which should be extended beyond the client user organisation itself, i.e: should be structured to incorporate trading partners.
- Interface EDI software to business applications and upgrade related applications.
- Assist in CASE strategy implementation.

With many EDI projects in Western Europe still in either the pilot or the production test phase, the number of opportunities for professional services firms who are not currently providing network or software services is bound to increase. The process of dynamic change throughout Western Europe in the next four years will result in a steeply rising user need for the professional services outlined above: a quality service product and an effective marketing strategy will result in substantial numbers of contracts being put out.

4. Partnering

INPUT believes that despite the problems still to be overcome, pan-European or international EDI is an opportunity, and that there is a requirement for companies to come to market with offerings covering EDI services on a third-party basis:

- Large accounts (multinational corporations) will require international EDI.
- The ability to offer international EDI reflects the service provider's position and image in the market. A full-service EDI provider will be expected to have international services, even though the smaller accounts will not need such services.

Third-party service providers will normally require a variety of partners to facilitate and optimise an international EDI service. For example, the banks, particularly those with trading partner subsidiaries, often have in place networks, and have developed financial management products useful to international trading. Bank networks supporting international needs can often be made available to other corporations at a marginal cost, whilst the banks' expertise in technical services may be available to build networks in regions currently unserved. SWIFT, Cedel and Euroclear are all active in re-assessing their strategic partnering relationships. The different types of EDI networking solutions currently in existence are illustrated in Exhibit V-11.

Other partnering options may be found among the major accounting firms, which are developing accounting and information management systems for multinational trading firms. Digital has announced service agreements with Coopers Deloitte and Price Waterhouse.

Software vendors selling packages to international trading customers can bring active customer lists and application-specific expertise to a partnering relationship.

Large multinational corporations will naturally be the prime targets for international EDI services, but they may also serve as co-developers of such service products. Large multinationals often have internal expertise that may be leveraged in broader markets and may consider migrating their private network implementations to public services as international EDI availability, usage and acceptance grows.

EDI software vendors, in particular, should be looking to develop alliances with computer vendors to develop turnkey systems for smaller users and for industry sectors with specific requirements. Additionally, software vendors will benefit from strategic partnerships whereby a pooling of resources leads to a strong development, marketing and support organisation.

Partnering opportunities may be found with networks not currently offering EDI. A good example might be the PTTs, who may be offering EDI services in the near future. Such plans could represent a threat, by virtue of the size of these companies, to the current players.

The world's post offices are also working to counter the present challenges to their traditional revenues coming from the telecommunications operations and the world-wide courier companies. Unipost International Post Corporation SA was set up in January 1989 in Brussels by 21 postal authorities from Western Europe, Australia, Canada, Japan and the USA.

5. The Role of the Banks

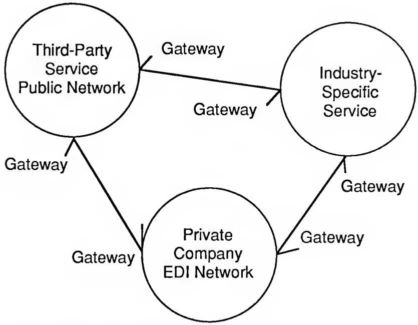
At the generic level of EDI, banks have been involved for a long time in areas such as electronic funds transfer and clearing - the Society for Worldwide Interbank Financial Telecommunications (SWIFT) is an example.

However, banks' focus has been almost exclusively on the internal operations of the banks themselves and the related inter-bank transactions. SWIFT standards have not been primarily concerned with the transmission of data between banks and their customers. SWIFT standards have therefore tended to differ greatly from the evolving EDI standards in terms of format and content. However, the commercial aspects of a transaction are an intrinsic part of the financial and credit

aspects of the same transaction. The shipment of goods between two trading partners must of necessity always be connected with a payment for goods.

EXHIBIT V-11

Three Types of EDI Networks


Third-Party Service Public Network
Gateway
Industry-Specific Service
Gateway
Gateway
Gateway
Private Company EDI Network
Gateway
Gateway

The key issue for the banks now is how to extend this from interbank message transfers to the electronic transfer of all trading data between each other and their customers. Many past examples of generic EDI have taken place within closed user groups, each setting their own standards of message format and communications protocols. The main focus now is on developing inter-sectoral and international links in a lattice network. The banks realise they will have to accommodate links with their corporate clients if EDI is to progress in a structured way.

Within the EDIFACT finance group - MDB.4, with a secretariat provided by SWIFT, the investigation of the use of EDIFACT standards for banking messages and also working with the US ANSI and EDIFACT groups, is proceeding and is helping to create a form of world-wide EDI banking co-ordination.

The Barclays and National Westminster groups in the UK have in 1990 set up EDI Services for their Corporate clients. This type of service will continue to be introduced.

It will be increased competition that will force the banks to take on EDI standards. If they get it right in terms of standards and delivery channels then the banking function will play a key role in the EDI chain by 1990.

VI

Analysis of Country Markets

VI

Analysis of Country Markets

A

Overview

Although Southern Europe has come to be seen as the region most likely to provide the most dynamic growth over the next decade, the heart of the European economy still lies in the traditional areas: France, West Germany, the UK and Benelux. It is in these more northerly areas that the preparations for the integrated market in telecommunications have been most advanced.

In the UK, the central Government, following the US example with the dismemberment of AT&T, started to liberalise telecommunications equipment sale and service provision in the early 1980s by privatising British Telecom (BT) and introducing competition in the form of Mercury. A number of other network services vendors, such as IBM, GEIS, CSC and EDS were attracted by the re-written rules and the promise of profitable investment once traffic could be diverted from the public networks onto their own, principally leased line based, systems.

The privatisation of BT also introduced into the world market a new global player, roughly equal in size to the 11 regional telecommunications operators that resulted from the break-up of AT&T. Like those regional operators (the RBOCs), some of whom have already entered the European market, BT intends shifting the emphasis of its activities from its traditional home base to become one of the key service suppliers on the world market.

Apart from the Spanish public telephone operator Telefonica, BT is the only privately-owned national European operator in Europe. Nevertheless, it can expect stiff competition from the French, German and Dutch PTTs, since all national telephone companies know that the days of the telecomms monopoly are numbered.

EDI has reached a different stage of development in each country in Europe. Whilst the key factor underlying these differences between countries is the extent of deregulation of the telecommunications services market, there is a marked difference in the approach to EDI in mainland Europe, where it has been translated via direct links between trading partners rather than by adopting the clearing-house approach favoured in the UK.

France's bearer networks are now the most modern on the continent, following the programme which brought about the introduction of digital switching and transmission techniques. France Telecom had predicted that by the end of 1990, 80% of both trunk exchanges and local exchanges would be fully digital.

Data users in France have access to what is claimed to be the world's largest packet-switching service, Transpac which handles some 40,000 direct connections and transmits over 1,000 billion characters of data per month. The French legislation liberalising telecommunications:

- Gives ministers the power to add a 30% surcharge on lines leased for value-added services.

- Requires specific ministerial permission before a vendor can operate value-added services over lines with a capacity greater than 3.5 or 5 Mbytes per second for limited (i.e. industry specific) or general networks respectively.

- Requires that these lines should not be used to carry voice traffic.

- Requires that the value-added portion of the service must attract at least 85% of the final charge - i.e: a maximum of 15% is being allowed for the basic transport charge.

Other stipulations affecting vendors in the French market are:

- Services such as protocol conversion, a staple service of the independent network suppliers, is not permitted, being considered a basic telecomms function.

- Managed network services (MNS) are not permitted - unlike in the UK where US-owned service providers such as GEIS have been encouraged to operate.

France Telecom and BT will be competing for status as the natural switching point for traffic into and out of Europe, seen as a lucrative opportunity by all the European PTTs. Private suppliers threaten to skim off a substantial part of the revenues of the PTTs and to counter this the abortive MDNS proposed by 22 PTTs came to be conceived.

The UK is still the most penetrated European market in terms of third-party services. INPUT estimates that there are approximately 10,000 users of European EDI services, with 60% of them currently in the UK.

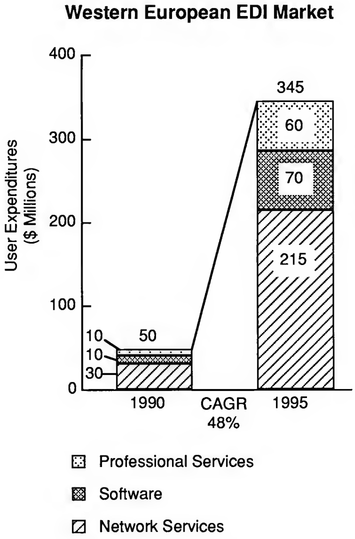
Projects being launched now are making use of the first messages issued by the international EDIFACT standards body. This standard will be harmonised in due course with the US ANSI's X12 standard. The European Commission (EC) has sponsored several EDI projects, including COST 306 for the transportation sector.

The 1990 EDI market in Western Europe is estimated to be worth $50 million and is expected to grow at a compound annual growth rate of 48% to reach a $345 million market by 1995. The EDI market components are:

- Network Services.
- Software Products.
- Professional Services.

These sectors are shown in Exhibit VI-1 which highlights the market domination of the network services sector over the other two in 1990. This dominance is not expected to decrease with time as critical mass rises and costs drop, so that by 1995, with the software and professional services showing a marked increase, its share will have remained steady at 62% due to the offsetting trend of sharply increased transaction volumes.

EXHIBIT VI-1



EDI's strategic importance is reflected in the very high levels of interest and commitment shown to its development by government bodies and commercial associations representing many industries. The European Commission has sponsored the TEDIS (Trade Electronic Data Interchange Systems) programme to promote a standardised approach to EDI by all potential industry and government users as well as examining the legal, technical and implementation issues.

B

U.K.

1. Market Size

The largest individual country market for EDI software and services, the UK is still currently leading the rest of Western Europe. Its market represents just under 50% of the total Western European market due to the development of a third-party clearing-house market in which three vendors are active. The estimated size and growth of the UK sector is shown in Exhibit VI-2. This market amounted to £12 million in 1990 and is expected to grow at a slower pace than the rest of Europe due to the more advanced status of EDI within large UK companies. By 1995, the UK market will be worth £56 million, and will even then represent over 30% of the Western European total. Leading EDI Software and Services vendors are included as Exhibit VI-3. The placing (in revenue terms) among the top four has not altered in the past year.

The process of telecommunications liberalisation in the UK has promoted the development of EDI services, with the UK becoming important for international EDI, serving as a principal hub and gateway for data between Western Europe and the USA. A second factor which has fostered the market has been the adoption of a narrow set of EDI standards for a broad cross-section of industries, using the Tradacoms standard.

The majority of UK users are linked with the Article Numbering Association (ANA)'s retail and distribution initiative. The ANA has played a large part in the UK's early adoption of EDI. In its principle role of administering the international numbering and barcoding initiative, it was responsible for putting together its own standard for EDI, called Tradacoms, which is now used by more than 2,500 firms in the UK. Traffic on the UK's networks has been growing at around 20% per month.

2. Network Services

The three major network service providers offering EDI network services within the UK continued during 1990 with the same placing in terms of numbers of users and revenues gained:

- INS
- AT&T Istel
- IBM

International Network Services (INS) is the joint venture between GEIS and ICL which was formed in 1987. In addition to the services described in INPUT's 1989 EDI report, INS has launched new services during 1990. The following existing services earned the greater part of the company's 1990 revenues:

- Tradanet is the commercial EDI trading service applicable to all types of general trading and especially to the wholesale and retail sectors. It is endorsed by the Article Numbering Association (ANA) and is based on the ANA's Tradacoms standard, as well as being able to handle the ODETTE and EDIFACT standards. It uses OSI standards for the architecture of the network. It is the UK's leading EDI service, providing store-and forward and clearing-house services in over 20 market trading areas, including: food, clothing, chemicals, mail order, department stores, pharmaceutical wholesaling, white goods, electronics, public utilities and authorities, distribution services, DIY, brewing, leisure goods, oil and petroleum products, opticians, music, fast food outlets and publishing. Nine of the top ten retailers in the UK and over 50 of the Times Top 100 companies subscribe to the service. Another 800 Tradanet users subscribed during 1990. The service signed up its 2,000th subscriber in the middle of the year.

EXHIBIT VI-2

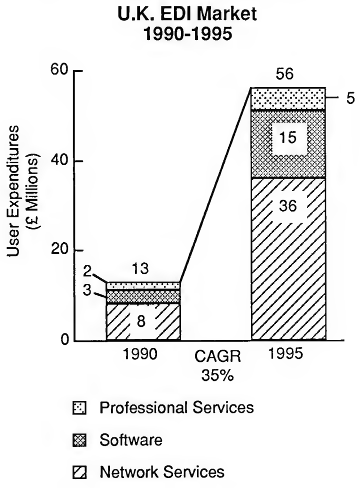


EXHIBIT VI-3

Leading EDI Software and Services Vendors, 1990—U.K.

Rank	Vendor	1990 Anticipated EDI Revenues (£ Millions)	Market Share* (Percent)
1	INS	7.1	56
2	AT&T Istel	3.5	28
3	SD-Scicon	0.8	6
4	IBM	0.6	5
5	Perwill	0.2	2
6	Digital	0.1	1
7	EDS	0.1	1
8	Hewlett-Packard	0.1	1
9	Price Waterhouse	-	-
10	ESL	-	-
	Others	0.2	2
	Total Market	12.7	100

Note: Does not add to 100% due to rounding

Many different types of computer equipment and software are interfaced to Tradanet, whose international links are provided by a link to the international service of INS's GEIS shareholder, the GEIS EDI*Express service. Tradanet also links other INS services, i.e: Motornet and Pharmnet. The international interconnection is a full application to application bridge, requiring no specialist equipment or software since the bridge is totally transparent to the end user. A number of industry and trade associations have been involved in the establishment of the networks, including ANA, SMMT, AMDEA, ECIF, AFDEC, DISH and EDICON.

- Motornet is a specialist trading service aimed at automotive manufacturers, suppliers, customs agencies and shippers. It was created by GEIS in conjunction with the UK's Society of Motor Manufacturers and Traders (SMMT) and the Europe-wide Organisation for Data Exchange by Teletransmission in Europe (ODETTE) which has national branch organisations in each country. Motornet provides a commercial document exchange for the automotive industry, primarily in the UK, but also handling international links. The principal documents carried are invoices, schedule releases and advice notes, using

the ODETTE standards formats. Motornet is linked to GEIS' worldwide EDI*Express service as well as being interconnected with Tradanet and Pharmnet.

- Pharmnet is a specialist trading service aimed at the pharmaceuticals supply chain. It provides a service for Regional Health Authorities, wholesalers, other suppliers and the pharmaceutical manufacturing companies to enable them to transfer documents electronically. As in the cases of Tradanet and Motornet, Pharmnet is linked to GEIS' worldwide EDI*Express service. Eight of the world's top ten pharmaceutical companies operating in the UK are subscribers to Pharmnet, and a majority of the ABPI (Association of British Pharmaceutical Industry) members are also contracted to the service. Several Regional Health Authorities (RHAs) in the UK are using the service and following the recent National Health Service initiative which recommended the use of EDI and the endorsement of INS as a vendor to provide EDI services to all the RHAs for pharmaceutical and general supplies; it is expected that all RHAs will eventually join the service.

- INS also offers Brokernet, a specialist EDI service for Motor and General Insurance businesses, offering a leasing facility to brokers, insurance companies and syndicates. Brokernet links the computers of insurance companies, underwriting syndicates and other service providers to each other and to their intermediaries across the UK, irrespective of location. Brokernet has enabled companies to bypass the technical intricacies of different internal systems and use a simple standard set of instructions to do business whenever it suits them. Brokernet standards are based on TRADACOMS but Brokernet also supports the EDIFACT syntax.

The INS service extends to several dozen UK underwriters including all the major composites who market their product through high street brokers, and the entire membership of the Lloyd's Motor Underwriters Association numbering 35 syndicates. Important brokers with multiple outlets such as the Automobile Association (AA), which is the largest motor insurance broker in Europe, as well as the top system suppliers to the high street broker market are supporting Brokernet through sitting on the Brokernet Executive Committee, formed to promote and develop the INS EDI services to the industry.

Additions to the INS user and product portfolios which took place in 1990 are:

- The launch of Ethos, a low-cost or entry level service for smaller hospital suppliers wishing to trade with the UK's National Health Service. This product can be taken at one of two levels:

  - Ethos-PC, installed for approximately $4,000, is for the small supplier who has or can afford an industry-compatible PC. He can then process his trading documents in a free-standard mode or by direct connection to his applications.

  - Ethos-fax, costing an initial $1,200, is for the very small user who does not have a computer but wishes to trade electronically with the NHS. He can later upgrade to Ethos-PC. Ethos acts as a closed user community preventing unauthorised access by non-subscribers through use of a secure password. It supports both TRADACOMS and EDIFACT standards.

- After a year's contract with Polygram, the UK's largest music distribution company, INS was awarded a three-year contract by Eros Ltd, a consortium which also included two other of the country's top five record distributors. This trading community is expected to include up to 10,000 retail outlets. One retail chain is reported to be putting its shops on the system at around 20 a month.

INS has expanded its service coverage into the international arena through its link to GEIS' US-based EDI*Express. This is estimated to make Tradanet the world's largest EDI community. INS offers an application-to-application link with full accountability, audit control and security across a gateway, benefiting international trading groups like CEFIC (chemicals) and EDIFICE (electronics) which are exchanging invoices, orders and shipping documents both Europe-wide and worldwide. INS has developed a software package called Equator aimed at exporters, freight forwarders, liner agents and carriers.

INS is active in all of the subgroups of the UK EDI Association. This has stimulated the company in gaining EDIFACT expertise and enables it to offer standards consultancy to its prospects and customers.

INS has also made inroads into the market areas being created through the convergence of EDI and EFT. A trial contract awarded by the UK's banks' cheque clearing service, BACS, set-up BACSNET to enable INS users both to exchange the usual EDI documents - orders, invoices and picking lists, and also to transmit payments and direct debits to BACS in the BACS standard proprietary formats. INS was instrumental in running the Trade Payments pilot scheme for National Westminster Bank.

AT&T Istel is one of the largest European professional services companies operating in Europe with a reported turnover of around $200 million. AT&T Istel Global Messaging Services Limited was formed in February 1990. The company was the first fruits of the acquisition of Istel by AT&T and is designed to bring together the main strengths of the two organisations:

- AT&T's position and reputation in the global telecommunications marketplace.
- Istel's understanding of how to add value to computing and communications in focussed marketplaces.

The company has over 100 employees and offers messaging products from both parent companies:

- EDICT - one of Europe's leading EDI services.
- AT&T EDI - AT&T's US EDI service.
- AT&T Mail - an electronic messaging service with connections to fax and telex, and also over fifteen X.400 interconnections already in place.
- AT&T Enhanced Fax - a new service that increases the functionality of standard fax machines by adding to them the kind of facilities available to electronic mail users, such as handling broadcast lists and mailboxing.

This presents a powerful set of products backed up by an increasing global support infrastructure. The majority of the services run on a UNIX based, X.400 compatible Universal Messaging Architecture (UMA), offering true flexibility. This UMA facility is currently being deployed around the globe, with the appropriate support infrastructure. At present, Global Messaging Services has nodes and support facilities across:

- USA - where AT&T has a number of nodes and a high level of support for the services.
- Canada - offering a Global Messaging Support Centre.
- Japan - where AT&T Jens has a node and similar support infrastructure.
- Europe (UK) - where AT&T Istel Global Messaging Services has a node in London's Docklands.

Other countries can be accessed via public or third-party networks but many will soon have their own dedicated node and support infrastructure.

AT&T Istel (Istel) claims with its Global Messaging Services to offer a single point of contact for all user message movement and management needs. In the EDI area, before its acquisition Istel had built on its strong

base in manufacturing. As an offering Edict is a general-purpose EDI service that supports various standards. The most widely-known subset of Istel's EDI services is the Edict service for the automotive industry which runs in competition with INS' Motornet. This is a key market for both players since the major suppliers to the automotive industry also supply many other sectors.

Edict's customer base evolved by following existing trading links throughout the UK economy, firstly with the backing of Austin Rover and later with ODETTE endorsement, promoting the service within the automotive manufacturing community. Due to the overlap between the automotive and other industries, a much wider range of companies were then attracted to the service - from aerospace through to mining and chemicals. This quickly successful initial thrust into the engineering and manufacturing sector obtained what now accounts for 70% of Edict customers, providing the vital "critical mass" crucial for successful operation. It has led on to sectors where suppliers trading on the periphery of the engineering industry can also now realise the benefits of EDI.

Edict is currently marketed as part of a larger entity called Global EDI, that incorporates the AT&T EDI service offered under AT&T Unified Messaging Architecture (UMA). The European installed base makes it a multi-sector EDI service with customers in engineering, manufacturing, distribution, health, and travel as well as the financial sectors. Edict is very flexible in terms of data formats and can handle the following document layouts: UN GTDI, TRADACOMS, ODETTE, ANSI X12, VDA and EDIFACT.

There are over 40 different types of computer connected to the Edict service, with one third of these being different types of micro. Istel also offers a range of software tools that can aid users coming on to the service. These range from a basic receive and print module to a full application interface product.

The Istel network is connected to a number of other networks both in the UK and throughout the world. Edict has customers in the US, Japan, Western and Eastern Europe. Customers access the service through a variety of networks, using a variety of access methods. Istel has devoted considerable resources to the achievement of interworking with other suppliers and networks to handle EDI on both the national and the international levels. In fact Istel was the first supplier to recognise the value both to its users and to itself of having fully supported links to the rival EDI communities.

IBM, with its Information Exchange product, stresses the connectivity component of networking through its international network service. IBM believes strongly that users do not need to own or run their own networks

and that it can offer supplier accountability with its Managed Network Service, thus positioning the service as a "utility" in which the customer is isolated from the running of the network. This is a much more "hands-off" approach that those adopted by either of the other two EDI network vendors.

IBM's penetration of the UK EDI market has been uneven and disappointing. Its critics would say that this is a consequence of its hands-off stance. The company's first two key contracts were:

- The development of a network and a wide range of associated services for the London Insurance Market.
- The contract for the Reinsurance market network, RINET, which was set up in 1988 by eight of the leading players in the European reinsurance market, with Mercantile and General Reinsurance as the UK representative.

IBM (in common with other large equipment suppliers, notably Digital and Hewlett-Packard) is offering its user-base "gateway" systems which will sit between the internal user systems and the networks of the EDI service providers to channel and control EDI messaging in and out. This product complements its utility service approach. One IBM user who has recently implemented a system using this approach is the Texas Homecare DIY group with 200 stores in the UK. A system built in-house handles the interface between its suppliers and its stores, using IBM Information Exchange as a carrier network. In some cases its suppliers, the large ones, have adopted onward links to their own suppliers in turn. The hub of the network is TRIM (Texas Retail Integrated Merchandising) which links to the in-house IBM EPOS equipment and provides the gateway to the external world.

As Exhibit VI-4 shows, INS holds over 60% of the UK's EDI network services market, while Istel has almost a third and IBM has still not attained a 10% market share and is in fact like INS losing share to Istel. INS has almost 2,500 contracted subscribers, and another similar figure can be accessed in Europe via GEIS' international network. Over two million document "envelopes" are exchanged each month over the INS network alone, with the volume increasing at the start of 1991 by 5% or more per month.

Istel has over 1,000 users, with its largest customer base being in the automotive sector. The link established between Istel and IBM provides both companies with opportunities to increase their transaction volumes. For IBM the advantage is that customers using Edict and IBM's own EDI offering, Information Exchange, can access both services over a single network connection. The benefit for Istel is that IBM's network

can serve as another international gateway into and out of Edict, whose store and forward EDI capability can already handle different formats from various business sectors and can translate between any two of them.

INPUT judges that interconnection and interworking between networks is critical for the EDI market to develop. Vendors should by now be regarding the network as a commodity product, with the differentiators being:

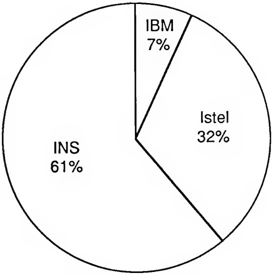
- Ability to guarantee and provide local support.
- Integration with other applications systems both in-house and external.
- Professional implementation and integration services.

Other network services providers with not so significant EDI revenues in the UK are:

- Midland Bank which relaunched its internal telecommunications network in April 1989 and already sells data transmission services, via its own network, to third parties, principally corporate customers and travel agents.
- Barclays Bank with its EDI Trading Master service launched in late 1990, which uses BT's packet switch service as the carrier.

EXHIBIT VI-4

U.K. EDI Network Services Market 1990



- NatWest Bank has its EDI settlement product, called BankLine Interchange, which is available through the three major U.K. service houses, INS, AT&T Istel and IBM.

- British Telecom (BT), through its Managed Network Services division is offering network links to provide a backbone for its worldwide infrastructure and has announced an EDI offering on top of its existing E-mail, messaging and information gateways. BT has tested its newly developed EDI system internally over two years and hopes to reach a large EDI audience by offering the alternatives of X.25 packet switching or X.400 message handling or a mix of the two as EDI transport mechanisms. EDI users will be able to send messages over BT's worldwide Dialcom X.25 network to other Dialcom subscribers in the UK and abroad.

3. Software

The EDI software sector is a fast-growing, highly competitive market which provides the key elements needed to link service provider, trading partner and an organisation's internal systems. EDI software, being central to the installation, provides an opportunity both for software and professional services companies. However, it has suffered over the last 12 months from various pressures tending to constrain growth and initiate a shake out:

- Too many products chasing too few customers.

- Not enough truly multi-standard products.

- A slow down in PC Product take-up as larger customer move to mainframe-based production systems for EDI.

SD-Scicon is the leader in UK EDI software development offering both products and services from its EDI "Centre of Competence." The company has structured its EDI work into four distinct areas and this approach is being adopted by a range of software companies throughout Western Europe.

Three of these areas come under the UK EDI Technical Centre in Cheadle, Cheshire, UK:

- Product development
- Consultancy
- Support.

Implementation projects for specific single clients come under the control of one of the other divisions if EDI is part of a larger project. In these latter cases, software products and professional services may be provided by the EDI Technical Centre.

SD-Scicon distributes the Interbridge data translation software under a non-exclusive agreement with Sitpro, its originator. The company has integrated Interbridge into two packages of its own design, the PC-based EDI Workstation (EDITRADE) and the EDI Message Handler. The Interbridge developed by Sitpro, is a flexible EDI formatting and deformatting translator which forms the interface between the in-house application data, being extracted from an organisation's information system, and the accepted industry standard formats needed for interchange. Using table- and parameter-driven techniques, the software insulates the corporate system from the complexities of the standards in use and ensures that new or amended EDI messages can be implemented with minimum disruption.

Interbridge has an installed user base of over 1,500 organisations worldwide and has been endorsed by most of the leading computer manufacturers and trade and industry associations. Other products marketed and/or supported by SD-Scicon are:

- A new (1991) workstation product aimed at the multi-network, multi-standards market and based on a flexible WIMPS-style user interface.
- A range of products taken over from the failed Compument software company, which display good profitability characteristics.

SD-Scicon has also been responsible under specific consultancy assignments:

- For the development of a number of EDI message management products and communications interfaces, e.g: the X.25 ODETTE File Transfer Protocol.
- For development of software products for the network service providers, e.g:
    - Intercept, the EDI workstation package marketed by INS,
    - EDIlink, an interfacing product for PC and MVS environments for use on IBM installations.

Digital launched an integrated software product called VAX/EDI in 1988 which provides a complete EDI capability to exchange data over networks or via direct communications. The VAX/EDI product automatically transfers data to and from an application programme via a trading partner's mailbox on a network and can also transfer or receive data directly accessing the partner's application over a leased line.

In August 1990 Digital introduced DEC/EDI, as another generation of EDI product, compatible with all VAX platforms and designed as an EDI gateway product for the centralisation of formatting, translation and

switching between internal applications and external or private networks. The product price ranges from $15,000 for a basic MicroVAX platform up to over $100,000 for a large mainframe implementation. It is a worldwide product and is expected by Digital to be installed by the end of 1991 with an installed base in the low hundreds throughout Europe.

Another company achieving some success in the development and provision of EDI software and services is the Perwill Group based in Alton, Hampshire. Hewlett-Packard is one of the major computer manufacturers that has chosen Perwill's EDIFORM/3000 and EDIPARSE/3000 solutions for its EDI trading requirements. Perwill's product family presents a single set of software that facilitates trading using either ANSI X12 or EDIFACT standards and allows connectivity to most networks on a multiple option basis. Perwill products now also cover:

- IBM PC compatible platforms.
- UNIX platforms.
- MVS environments.
- Due out in late 1991, VAX products.

Other users of Perwill software include Shell and ITT Cannon.

Istel supplies its EDI software and professional services support to other IT vendors or to large users, e.g. EDICT has been supplied to EDS for its major EDI network in Europe being set up to communicate between General Motors and its suppliers throughout Europe.

The royal Bank of Canada has chosen EDICT to mount and offer an EDI service to its clients. The service will be known as R*EDI*CON.

IBM United Kingdom launched EDI software for the MVS environment and the mid-range machines in 1989. The Data Interchange software provides users with a set of tools to create form-fill screen images for documents to be translated into EDI formats. These formats specify how to identify different types of items in a structured business document. The IBM software supports EDIFACT as well as ODETTE. In 1990 IBM launched its EDS gateway product geared to and compatible with any SAA (Systems Applications Architecture) platform.

1990 saw a slow down in the sales growth for PC-based software products, as UK users caught their breath and reflected on what they had learnt about EDI's impact in their applications, in preparation for implementation of more serious production systems.

4. Professional Services

Professional Services is potentially the most demanding sector of the EDI market. The requirements are not only expertise in a "leading edge" software technology, but also expertise in strategic business consultancy, project management and systems integration.

SD-Scicon, for example, is currently supporting a user base of over 1,500 customers, including many of the UK's top 100 companies, as well as companies in Western Europe supported through agency arrangements. Digital is another company which is reorganised to take account of the demand from large and medium-sized organisations in its user base for a range of professional services offerings, including:

- Consultancy to assist organisations by advising on the standards and messages to use.
- Implementation services to assist in the development of specifications and plans, and to recommend the most suitable hardware and communications equipment.
- Systems management contracts including systems integration and/or facilities management.

IBM's goal is to have 50% of its European business conducted electronically by EDI by 1992. At present, suppliers are being encouraged to join IBM's commercial network and to communicate by E-mail as a first step towards implementing EDI.

Sitpro has played a major role in the development of the EDIFACT standard and publishes the "EDIFACT Service", from its EDI Standards section. The EDIFACT Service is designed to give information, advice and guidance to any organisations undertaking the introduction of EDI using EDIFACT standards.

The Tradanet User Group was set up in June 1988 in order to provide a forum for the exchange of ideas and experiences and a single communications channel to relay business needs to INS and the ANA. The prime objectives of the group are to recommend future developments and to liaise with industry groups and EDI bodies, both internationally and nationally. An EDICT User Group was formed and held its first meeting in October 1990. Over 200 members attended out of the 1,200 in the user base.

5. Vertical Sectors

In the UK, discrete and process manufacturing, services, wholesale and retail distribution and transportation are the fastest growing sectors reflecting the nature and business origins of the network service providers. Most vertical sectors in the UK are experiencing intensely active interest in EDI with central and local government now also turning to this technique in a concerted manner.

C

France

1. Market Size

France is the second largest individual country market for EDI software and services. The estimated size and growth of the French market is shown in Exhibit VI-5. The market achieved FF 48 million in 1990 and is expected to grow at a compound rate of 58% to reach FF475 million by 1995, representing 22% of the Western European EDI market. The leading French EDI Software and Services vendors are shown in Exhibit VI-6.

The reticence shown by the French Government and the PTT to allow third-party suppliers to offer EDI services capable of serving a large range of sectors has hindered the development of a broader market.

Although France is well ahead of most of the rest of Europe in the implementation of EFT and videotex services, it lags behind the UK in the development of EDI. The retail, distribution, automotive and aerospace sectors are the most advanced. Major studies have been made towards the development of an automated customs system for transborder trade. Initial moves have been made in the specialist areas associated with the transfer of legal data, accountancy data and construction project information.

In late 1987, the French administration issued new rules for third-party providers, maintaining fixed rates on leased lines from the PTT. The rules restrict the level of charges which can be levied. These must be limited to no more than 15% for basic carrier services, with the balance of 85% coming from the value-added components of the services.

2. Network Services

The arrival of X.400 services in the market has been one of the major driving forces in the EDI market in France. Given the lack of established proprietary EDI services, the emergence of X.400 as a viable standard since 1988, has led France Telecom's free-market subsidiary, Transpac, to position itself in the network services provider business as a provider of EDI and X.400 based services, the one based on the other. Transpac has been well protected by the regulations as the monopoly supplier of

the X.25 national packet-switching network. It now benefits from special tariff measures as an inducement to move into the domain regarded as one of the natural provinces of the value-added service vendors, i.e., the development of private dedicated networks for client applications such as the Esterel network for tourism and travel.

Transpac's market coverage, and that of Interpac, which offers a private service of packet-switched data transmission at an international level based on the Infonet network, provides it with an excellent platform for EDI services.

EXHIBIT VI-5

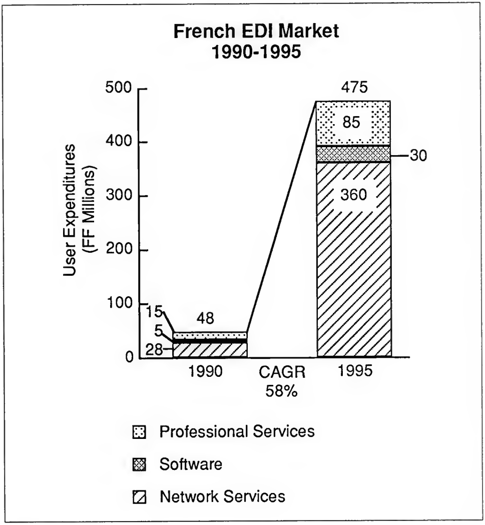


EXHIBIT VI-6

Leading EDI Software and Services Vendors, 1990—France

Rank	Vendor	1990 Anticipated EDI Revenues (FF Millions)	Market Share * (Percent)
1	GEIS	20.2	42
2	GSI	11.1	23
3	Transpac	4.8	10
4	Bull	4.6	10
5	Axone/IBM	1.9	4
6	EDS	1.7	3
7	Telesystemes	1.2	3
8	GLI	0.7	2
9	GTF	0.6	1
10	Segin	0.5	1
	Others	0.8	2
	Total Market	48.1	100

Note: Does not add to 100% due to rounding

The completion of the pilot phase of the Atlas 400 electronic mail service, which investigated those companies that were interested in linking via different sections of the X.400 protocols, resulted in the planning of over 100 contracts, including clearing-houses for specific communities to be run by various vendors (including Bull, Digital, IBM, Hewlett-Packard and Telesystemes). Amongst these are industry associated groups such as GALIA (automotive), EDONI (distribution) and EDI CONSTRUCT (public works) that are using or proposing to use Atlas 400 for EDI. This development has undoubtedly created competition for the established international service providers. With Transpac's quasi-monopoly position behind it, Atlas 400 enters de facto into the EDI market place, enabling companies to exchange unstructured and structured messages between non-compatible systems, although it does not provide "in-network" facilities for translation and conversion.

Transpac is promoting decentralised solutions for translation and conversion, leaving this part of the added-value to be provided through its "clearing-house" clients or their communities of users according to how each sees fit for its own set of applications. One argument is that al-

though the French have entered the EDI market behind the UK and the USA, France benefits from a national X.25 environment already in place and enjoys the existence of a standard. This argument encourages the emergence of "islands of EDI", each built round a specific subset of requirements. Very much a vertical approach in keeping with France's strong market in industry-specific processing services, it has the unfortunate effect of postponing the achievement of a cross-industry critical mass when even small enterprises start to feel the cost justification of going over to EDI.

Transpac has teamed with Seres, the Bull/CAP Sesa joint venture, to develop a national network called TEDECO, which will link 2,000 of France's largest towns and cities with the Finance Ministry. A pilot project linking 37 users started in July 1990 and is expected to be completed in late 1991. The network is expected eventually to generate revenues for Transpac of around FF15 million a year.

Transpac's X.25 network will be used as the TEDECO transport mechanism. The message management function and the storage of public records and other archive material will be run by software developed by Bull and run on host computers provided by them. Those computers will be integrated into an existing Finance Ministry, which currently uses Alcatel machines.

The network will be based on the EDIFACT format. Users will be charged at the standard tariff for Atlas 400 services for messages sent over the network. Start up costs for users with computing equipment are based on a joining fee of FF2,500 for software and documentation and an annual subscription of FF2,000. For users with no computing equipment, a package costing FF6,500 is proposed, to include terminal/PC installation and training in the systems functions.

The French EDI market exhibits a marked polarisation between two approaches:

- The "product approach" as adopted by IBM, with its Axone joint venture.
- The "market approach", the development of specialist client applications, as followed by Seres with the ALLEGRO project.

Bull (Seres) has been contracted to set up the Allegro EDI network in distribution for Gencod, a trade organisation with 8,000 affiliated members, approximately 7,600 from the manufacturing sector and the other 400 from the distribution sector. Gencod members have for some time been exchanging stock and order information on tape and diskette. Allegro (Automatisation des Liaisons du Language Gencod par Reseau d'Ordinateurs) is the name of the EDI network to automate this process

still further. It enables distributors and manufacturers to exchange invoices, orders and messages of various kinds between their free-standing micros. In a later phase, Allegro will offer mainframe to mainframe links, but Bull's stated intention has been to get quickly operational in order to be able to demonstrate the benefits of EDI, at the same time pointing out to dissenters that the structure of the Gencod language is very similar to EDIFACT. Bull intends to migrate users to EDIFACT as soon as the demand appears.

Niche and vertical market approaches are set to succeed in France. An example of vertical market specialisation is found in GSI, whose EDI activity grafted easily onto the existing infrastructure of its network, which was already linking more than 5,000 customers worldwide in its chosen areas of specialisation in the automotive, transport and tourist sectors. The SNCF contracted GSI's transport division, GSI-Transports, to handle all dealings with its 40,000 freight customers.

This vertical approach is the trend in France. Using Transpac's basic but standard transport utility, different industry sectors can use existing commercial and trade structures to form communities of traders. There is little incentive to approach the traditional service providers, except for support in areas of activity not covered by existing structures. The service gaps to be plugged often concern:

- International links
- Specialist or more sophisticated product areas.

France differs from other European countries where industry is the driving force behind EDI. Here it is the government agencies that are playing a key supporting role for the technology in France. Even in France, part of the market for EDI software goes to the product developed by Sitpro, whose French equivalent, Simpro France, together with the Customs service and other external trade agencies, are instrumental in driving the market forward. During 1990 another agency was set up under the guiding spirit of the man who is sometimes called "the father of EDIFACT." Etienne Dreyfous was responsible for the origin of EDIFrance, a standards promoting group reporting to AFNOR, the French Administration's standards setting body.

3. Software

There are a number of software companies in France, developing EDI software, FTAM (file transfer and management) packages and application products for EDI. The leader in the EDI software field is GSI.

GSI has developed its EDI software from the strategic perspective of viewing business in terms of vertical industry or professional sectors, in order to allow data transfer to be treated in commercial terms rather than

using a specific technique. GSI's general software product, Dalog, is a transparent tool, as far as a user is concerned, with clearing-house facilities for trading, using different types of equipment, networks, protocols, applications and standards (both specific or internationally endorsed).

Dalog integrates and constantly updates all the information linked to the trading cycle, (reference of purchase order, invoice number, identification of shipment etc.) and is accessed by the various partners to the transaction in the form that each requires.

Simpro France is using two important marketing thrusts to promote EDI in France:

- Free software packages.
- Alliance with as many industry associations as possible.
- Well over a hundred companies are using the government's standardised official software package with all programmes being verified by the EDIFACT board, whilst Simpro France is working to promote EDI through three key French industry associations - Galia (automotive), UIC (chemical), and GFT (freight forwarders/customs brokers).

Both Digital and IBM have been promoting their EDI software in France with a strong push towards the centralised gateway approach in which a comprehensive in-house resident product switches between internal applications and external applications, these other reached via a raft of commercially available networks.

4. EDI Projects

Three major projects which reached public attention during 1990 are worthy of notice:

- EUCOM, the joint French-German-Dutch PTTs venture with GSI Transport-Tourisme (itself 34% owned by France Telecom) announced its first initiative, Transponet. Transponet is conceived as a Europe-wide EDI service for road hauliers and shippers, especially aimed at capturing the business of the smaller firms. It is seen as going well beyond the limited specification of the less than successful Videotex-based Transpotel, which ran into difficulties because of the uneven acceptance of videotex across the continent;

- Transpac announced the next trial phase of the TEDECO project (already mentioned earlier in this section). This second phase will link local government offices and other local public sector bodies such as hospitals with the first two central government bodies to come on-stream:

  - Public accounts department.
  - INSEE, the French central statistical office.

  The next two departments scheduled to come into the network in the third phase are:

  - Customs.
  - Tax offices.

- In the area of public building work, the Edival joint-venture was set up between:

  - Cogecom, the subsidiary of France Telecom and the holding company of Telesystemes, one of France's best known computer services companies.

  - Bougues, the largest building and civil engineering contractor working on public works.

  - CAP Sesa, the subsidiary of Sogeti.

A list of French EDI projects by industry sector is given in Exhibit VI-7.

EXHIBIT VI-7

French EDI Projects

Area	Project/ Association	EDIFACT	Operational
Transport Sea	Ademar (Le Havre)	N	N
	Protis (Marseille)	N	Y Axone
	Orca (Rouen)	Y	Y Telesystemes
	Edipoc (Cherbourg)	Y	N Simprofrance
Rail	Docimel (Curtems)	Y	N
	Hermes (SNCF)	N	Y
Road	Cost 306	N	Y
	GTF (Calberson)	Y	Y GTF
	GSI •		Y GSI
	Transponet	Y	EUCOM
Air	Cargoimp (Paris)	N	Y Air France
Automotive	Galia (Odette)	N	Y Transpac
Distribution	Gencod (Ear)	N	Y Bull (Allegro)
Glass	Ediglas	Y	N
Records	Musik	Y	N
Pharmaceuticals	Edipharm	Y	N
	Edimetal	Y	N
Mail Order	Edimorsel	Y	N
Building	EDI Construct/ Edival	Y	Pilot (Telebat)
Negoce Industriel	Edoni	-	
Local Government	TEDECO	Y	Pilot (37 authorities)
Accountants	EDIFICAS	-	

D

Germany

1. Market Size

The German market for EDI software and services is estimated to have reached DM nine million in 1990 and will grow to DM 80 million by 1995. This estimated size and growth of the German market is shown in Exhibit VI-8. The leading German EDI Software and Services vendors are included as Exhibit VI-9.

German industry became the engine behind European prosperity in the 1980s. The country's economy is now the largest in Western Europe and its dynamism is due to its strong export sector, giving a very positive balance of trade with the rest of the world. Successive governments during the 1980s have reduced inflation to under 2%.

The federal government has always encouraged the use of information systems and in certain key technical areas, such as scientific information and advanced software research, has funded development work. German businesses run some of the most sophisticated networks in Europe, but the business climate has always favoured the in-house or private network solution and this has done little to stimulate the VANS sector. EDI similarly has tended to be run for the benefit of a single large company with direct links to its suppliers. EDI using recognised message standards has therefore lagged behind other major countries such as the UK and France.

The operation and regulation of national telecommunications services in Germany has historically been entrusted to a federal body, the Deutsche Bundespost (DBP). This organisation has been, up to the 1st July 1989, the monopoly provider of telecommunication services, and of many equipment ranges also. In addition it has exercised the right to review and approve or reject any networking equipment provided by a third-party for sale on the German market. Under previous regulations, this DBP approval was required for any type of equipment. The process could be rigorous, was generally time consuming, and inevitably worked in favour of local suppliers who "knew the ropes" best.

This restrictive regulatory environment has not held Germany back in terms of technical developments for VANS but has restrained the commercial services from flourishing as true value-added network suppliers. The services provided by the Bundespost itself are generally of a very high technical standard but are low-level in application content and have never included EDI. For example:

- At the basic bearer network level the building of an optic fibre backbone network for broadband services is well advanced.

- The videotex standard adopted by the DBP (CEPT level 4) has the highest graphics quality level found in Europe.

Despite these achievements, prior to the 1989 liberalisation which resulted from the findings of a body called the Witte Commission, there was mounting user pressure on the government to relax the regime regarding the licensing of VANS providers because:

EXHIBIT VI-8

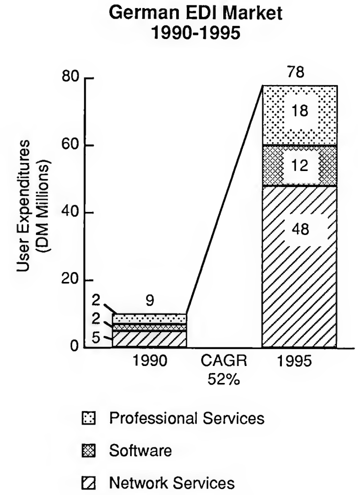


EXHIBIT VI-9

Leading EDI Software and Services Vendors, 1990—Germany

Rank	Vendor	1990 Anticipated EDI Revenues (DM Millions)	Market Share * (Percent)
1	GEIS	4.0	43
2	IBM	1.8	20
3	GLI	1.1	12
4	Actis	0.4	5
5	EDS	0.4	4
6	Softlab	0.3	3
7	Info Ag	0.3	3
8	Vascom/Siemens	0.2	2
9	SD-Scicon	0.2	2
10	Philips	0.1	1
	Others	0.4	4
	Total Market	9.2	100

Note: May not add to 100% due to rounding

- DBP was charging some of the highest prices for private leased lines.
- DBP was not offering any VANS with high application content whereas the more innovative users had built in-house systems which could be sold on to third-parties.

Other problems created by the regulatory regime and high prices were:

- VANS services of all types were not generally considered to be cost-justifiable.
- Multi-national companies were routing their national data traffic through other countries in which the cost of data transmission is lower, doing what is known as "by-passing."

International suppliers of VANS, such as IBM, which was bringing to bear pressure for liberalisation, were eventually joined by the EEC which made deregulation mandatory as the way forward into the Single European market.

In 1st July 1989, liberalisation of the regulatory environment was introduced following the recommendation of the Witte Commission, and DBP Telekom (Telekom) was set up to supply telecommunications services quite separate from the postal functions which had been previously part of the DBP's responsibility. Further liberalisation has led to the definition of three types of service:

- Monopoly services, e.g: Telekom retains a monopoly on basic voice traffic.
- Regulated services, which Telekom is obliged to provide but private vendors may also offer in competition, e.g. a packet-switching service.
- Unregulated services, which can be offered by Telekom or its competitors as they think fit, e.g: E-mail and EDI.

The rule forbidding connection of private services with public networks, such as the PSTN or public data networks like Datex-P, was retained, however, striking a fatal blow against those organisations considering extensive private networks. The suggestion by the Witte Commission that the present 25km private network rule (which lets you do more or less what you like within a 25km radius as long as you do not link Bundespost services together) be extended to allow for national coverage was rejected on the grounds that it would endanger the Bundespost monopoly.

2. Network Services

Several car manufacturers have developed extensive EDI networks to provide direct links to their suppliers and by the end of 1990, it was expected that most of the suppliers serving West Germany's six main car manufacturers would have been "obliged" to install facilities for EDI if they are to continue in this sector. In the case of Ford and Opel (General Motors), 100 per cent of suppliers will have to have adopted this mode of working by then. The plan for BMW is for coverage of 70% of its suppliers.

The early adoption of in-house, "user-proprietary" EDI-type systems is starting to prove costly and inefficient since it means that the individual supplier has to install and integrate separate terminals and modems for each of its customers, Ford, GM, BMW and Volkswagen for example.

The UK "clearing-house" approach is an obvious alternative, but two other options are finding favour in Germany where security and control of operations in-house have always ranked as an important buying criteria:

- The use of a hardware/software interface that can handle a wide range of the currently used data formats and communications protocols. This is a similar solution to the one adopted in finance dealing rooms, where external feeds have to be integrated into the dealer's desk. It is the short-term "best buy" for Germans in their present predicament since it allows for easy migration from communication using customer specific message types into the world of universal EDI standards such as EDIFACT.

- The other, and more useful in the longer term, option is to plan for open network systems based upon truly universal standards and operating with X.400 as an EDI envelope to EDIFACT standard messages. The immense amount of work required before this ideal state can be said to have been achieved does not seem to daunt the German technologists.

Exhibit VI-10 lists the major EDI suppliers of network services.

The German banking system is adopting its own brand of settlement EDI. A project is underway involving Digital, Unisys and Softlab (the Munich-headquartered systems company) to link 13 banks in the Frankfurt region for settlement purposes into a "hub and spoke" configuration of community players. Each bank in the region will be linked to the central bank of Hesse State (the state in which Frankfurt lies), which will act as the clearing house for transactions. The linkage protocol chosen is the ISO's FTAM (File Transfer, Access and Management), with the eventual aim being to use X.400 and EDIFACT, once banking messages have been standardised.

The German central bank is interested in extending this system to other states. With each state central bank acting as the hub for the branches in its geographical region, a national settlement system would involve linking all the hubs and the federal bank itself into one network.

Actis, the German software vendor, has developed a hardware/software interface of the kind mentioned above. It is called the EDIbox. This acts as a front-end interface for the supplier's PC and its software enables different information formats, sent by various car companies, to be handled. The product has now penetrated the automotive industry in Germany, Sweden, France and Belgium. One Actis interface box is able to link eight parties, for example, one supplier with seven automotive manufacturing customers. It can link into proprietary networks (e.g: Fordnet) or via the third-party suppliers (e.g., IBM or Vascom).

EXHIBIT VI-10

EDI Network Suppliers in Germany

Vendor	Network Features	EDI Services
IBM	SNA	Information Exchange: X12, EDIFACT, UNGRDI
GEIS	750 Access points in 39 countries	EDI Express
Vascom	X.25 400 Access points in 50 countries	VASEDI: EDIFACT, ODETTE, VDA
Info AG	X.25 Nodes: 26 in Germany also via SPRINT	Info Netzservice X.400 EDIFACT (1991)

3. Software

The EDI software market in Germany has started to develop in line with other leading country markets, namely the UK and France. In addition to products for worldwide consumption supplied by international companies such as IBM, Digital and Hewlett-Packard, there are a number of national players such as Actis and GLI, both of whom have not only penetrated the German market but are also present in other European countries as well.

GLI's (Gesellschaft fur Logistik und Informations-Systeme), is a management and computer consulting firm whose principal specialisations are in the area of logistics and information technology applied to logistics problems. The company through its principals is active in the international development of EDI standards. GLI works closely with German national and the international bodies concerned with the co-ordinated introduction of automated trading methods.

Exhibit VI-11 lists the better known companies marketing EDI software products and services in Germany.

EXHIBIT VI-11

EDI Software Suppliers in Germany

Vendor	Hardware Platform Types Supported
GLI	PC or Mainframe
SD-Scicon	PC or Mainframe
Kasch	PC or Mainframe
IBM*	PS/2, AS/400 or Mainframe
Lion	PC
SAP*	PC
Seeburger*	PC
Actis*	PC
Network Consult	PC
Philips	PC or Mainframe

* Conversion software is integrated into a complete EDI package.

E
Italy

1. Market Size

The Italian market for EDI software and services in 1990 is anticipated to be worth under 3 billion lire but to be growing to over 45 billion lire in 1995. The estimated size and growth of the Italian market is shown in Exhibit VI-12 and the leading Italian EDI Software and Services vendors are included as Exhibit VI-13. Because of its relatively backward telecommunications infrastructure, which is now being improved, growth in the Italian market is expected to be high but starting from its low base.

Italy's is the third largest economy of the major European countries. It is only slightly larger than that of the UK.

In Italy, although telecommunications services are the domain of the PTT ministry alone, most of the public network has been run by private companies with whom the PTT has formed licensing arrangements. Many of these companies are at least partly owned by the state.

The state operates most of its services through subsidiaries of its major holding company, the Instituto per la Ricostruzione Industriale (IRI). The subsidiary controlling the telecommunications services is STET.

This company is subject to IRI and the PTT ministry's overall control, but otherwise acts as the central decision maker in the field of telecommunications.

Owned by STET are a number of subsidiary companies with direct operating responsibilities for the provision of specific types of telecommunications services:

- National telecommunications are the responsibility of the Societa Italiana per l'Esercizio Telefonico (SIP), which is the main PTO (Public Telecommunications Operator).
- Intercontinental telecommunications are provided by Italcable.
- Satellite communications are operated by Societa per Azioni per le Communicazioni Spaziale.
- Long distance and European telephony is in the hands of ASST (Azienda di Stato per i Servizi Telefonici).

STET is also a holding company in the field of telecommunications equipment, with a number of subsidiaries which have important shares in the manufacturing market. Italtel, directly owned by STET, is the leading equipment manufacturer in Italy with around 50% of the market for telephone switches and 25% for transmission links.

This complicated holding structure has contributed to the traditionally high level of inefficiency in the Italian telecommunications environment, and also retarded the growth of VANS. Service quality has been considered to be poor, with the result that take-up of even the basic services has been low.

EXHIBIT VI-12

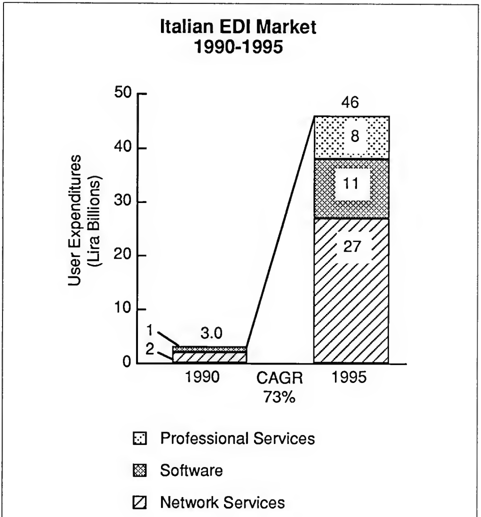


EXHIBIT VI-13

Leading EDI Software and Services Vendors, 1990—Italy

Rank	Vendor	1990 Anticipated EDI Revenues (Lira Millions)	Market Share * (Percent)
1	GEIS	1,040	37
2	Intesa	560	20
3	IBM	310	11
4	EDS	220	8
5	Televas	170	6
6	Teledis	170	6
7	Seva	120	5
8	Seat	110	4
9	Digital	45	1
10	Olivetti	40	1
	Others	25	1
	Total	2,810	100

Note: May not add to 100% due to rounding

In order to improve the situation several measures have been taken:

- SIP is engaged on a five-year investment programme called the Piano Europa. Some $30 billion on investment is involved.
- SIP, ASST and Italcable are targeted to be merged.
- Italtel has entered a joint share exchange scheme with AT&T, whereby AT&T technology will be available to upgrade Italtel's switching equipment range, for its product generation.
- Subscriber telephone penetration is set to rise by 1992 to 420 telephones per 1,000 of the population.
- Data services will be improved.
- Mobile radio public services will be extended as an interim measure pending introduction of the European standard GSM.

At present there are two key regulatory points affecting EDI and VANS:

- Basic public conveyance can be provided only through the state subsidiary companies.
- Commercial VANS can be operated by agreement with the public network providers.

The regulations are not unduly harsh by comparison with some of the other countries' provisions, but VANS generally in Italy have been slow to take off due to the country's relatively low interest in public data services.

Commercial VANS (that is VANS supplied by bodies other than the state) present a much better picture. GEIS, for example, has for some time obtained its second largest European revenues from Italy, ahead of France, West Germany and Scandinavia.

2. Network Services

Although Italy has been plagued by problems with its network infrastructure, Teledis, Italy's four year-old EDI service, was the first EDI service in Europe to be supplied on a public telecommunications network and has built up a user base of 200 companies in retail, manufacturing, finance and transport.

The Teledis service is run by Televas and uses Itapac, Italy's national X.25 packet switching network. Televas is owned 51% by STET, Italy's state-owned telecommunications holding company, and 49% by Feruzzi Finanziaria, part of the Montedison Group. Italian users have joined Teledis, in preference to a closed user group system, on account of the Televas software that enables access and provides communication and application functions.

Intesa, the IBM and Fiat joint venture, began marketing its network software and services in early 1989. Its EDI services compete with those offered by GEIS, which has traditionally gained one of its largest revenue components in Europe from Italy and still holds just under 40% of Italy's network services market.

The relatively small number of major corporations in Italy means that Intesa, the partnership between Fiat and IBM Italy, can make inroads into GEIS' business as Fiat, which is one of Europe's largest manufacturing companies, has been using GEIS for its communications. Fiat continued during 1990 to establish EDI links with a list of 400 suppliers.

Intesa is attempting to serve markets outside those presented by its parent companies. Since 1986, when the partnership began, most of Intesa's sales have continued to come from Fiat and IBM where new products are naturally tested. Intesa obtained the privilege to operate its own switches on the public X.25 packet-switching network under a special "Closed-User Group" program for important clients.

SEVA is one of the smaller EDI players. It was set up in 1985 and its shareholders include Olivetti, SIP and a number of finance houses. In 1990, it licensed the Edict software from AT&T Istel to use in its clearing centre. SEVA has 36 access nodes across Italy and can offer an international capability through the AT&T Istel network.

EDIFORUM is an association of companies who are promoting research in the field of legislative change in telecomms regulation, lobbying for legislative intervention, and beginning practical experimentation in EDI in parallel with paper-based book-keeping in order to compare the cost benefits of electronic trading, especially for small companies and family-sized units. The main objective of EDIFORUM is to stimulate the spread of EDI in Italy. This objective aims at making both commerce, and Administration and the public bodies responsible for telecommunications sensitive to the important issues. It is doing this by setting up co-ordinated working groups and by joining the international liaison projects in which decisions relating to EDI and technical standards are being taken.

F

Scandinavia

1. Market Size

The Scandinavian market for EDI software and services reached a value of SK 21.4 million in 1990 and is anticipated to grow at 58% per annum reaching SK 208 million in 1995. The size and growth of the Scandinavian market is illustrated in Exhibit VI-14. The leading Scandinavian EDI Software and Services vendors are shown in Exhibit VI-15.

The Scandinavian markets contain fast growing sectors for EDI due to:

- The high labour costs.
- Their dependence as countries on preserving their competitive technological edge.

This strategic importance of networks in Scandinavia is reflected by the high usage of:

- MDNS (Managed Data Network Services) for international traffic.
- EDI applications in the transport and trading communities.

In Finland, the first real EDI project started in 1978/79, was called Finnpro, and was backed by the government, the forest industry and transportation companies. In the early 1980s a similar project was launched for domestic trading called OVT (OVT is the Finnish acronym for EDI).

EDI is currently being used throughout the forest products industry where some 15 Finnish supplier companies are trading with 100 international partners. Although there are pilot projects and multiple systems in almost all industries, even in this highly penetrated society, there is still a long way to go before you could say that EDI is the universal medium of transaction interchange. The expansion of EDI is sponsored through bodies such as EDIFIN and the Joint Working Party for Data Communications.

Swedish distributors use EDI under a regional standard called Dakom. Currently over 50 wholesalers and 100 suppliers are involved, with the larger companies using direct links and smaller firms using either public or commercial data networks.

2. Network Services

In early 1988, Televerket announced plans to integrate its private and public networks and become the first carrier in the world to combine the use of its local exchanges as public telephone switches and as leased-line cross-connects.

One of the problems Sweden is facing is that of standardisation of documents to EDIFACT, since many organisations, especially shipping lines, forwarders, importers and exporters, have been already trading electronically using Dakom standards for many years. As most Swedish companies already have highly sophisticated information networks and since Sweden is such a highly export-orientated country with multinationals such as Volvo, Saab and Electrolux, there is a strong need to keep abreast of EDI applications whilst at the same time continually encouraging industry to adopt EDI and either accept EDIFACT or adapt existing systems.

EXHIBIT VI-14

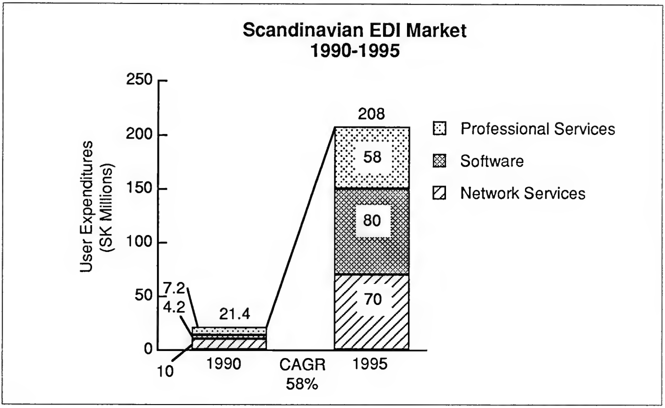


EXHIBIT VI-15

Leading EDI Software and Services Vendors, 1990—Scandinavia

Rank	Vendor	1990 Anticipated EDI Revenues (SK Millions)	Market Share * (Percent)
1	GEIS	7.7	36
2	IBM	5.6	26
3	DanNet	3.4	16
4	EDS	1.3	6
5	STS	0.9	3
	Others	2.6	11
	Total Market	21.5	100

Note: May not add to 100% due to rounding

Sweden is one of the most active European countries in EDI, and the work of Swepro (Swedish Trade Procedures Council) has been to persuade the smaller firms to get involved in using EDI, discouraging work on local projects, whilst stressing the need for any message designs to be fully international. Although Sweden is not a member of the European Community, this is very much in line with the EEC ruling. Swepro, as a government agency funded by industry, works closely with EC organisations that are engaged in EDI projects as well as with Swedish Customs that is aiming to have export procedures fully computerised by the end of 1991 and have an imports computer system installed by 1993.

GEIS is active in Scandinavia, targeting the automotive suppliers such as Volvo and Saab as well as other vertical market sectors such as shipping, transportation, pharmaceutical, banking and distribution. GEIS offers its full network services range as well as its range of software products (Trade PC, EDI*PC 5.0, EDI*T 2.4 and EDI*Central) and professional services.

TDL of Gothenberg, Sweden offers EDI services to approximately 15 companies in Scandinavia, The U.K. and Belgium. Industries supported are transportation services, automotive manufacturers, financial services and insurance companies. A Swedish customs clearance and control system called TRK is also being developed.

The Danish PTT and IBM Denmark are working together to provide the DanNet EDI services, which opened in early 1989, and provide:

- A basic EDI network service for exchanging documents in computer to computer communications.
- A conversion service which provides the interface between the user application software and the standard messages.
- An EDI workstation suitable for small users and pilot projects for larger firms.

Over 20 projects to be put on the network are in different stages of planning and implementation, covering the insurance, banking, retail and construction fields. The subsequent stage for DanNet will be to develop EDI services on an OSI-compatible base, i.e: FTAM and X.400.

The five Scandinavian PTTs (including Iceland's) have formed Scandinavian Telecommunications Services AB (abbreviated to STS) to offer a variety of telecommunications services to the Scandinavian multinational corporations. STS will be competing with other European international carriers offering MNS Services. Additional application services will be added as customer demand dictates, for example, X.400 E-mail products.

G

Benelux

1. Market Size

The Benelux market for EDI software and services in 1990 is anticipated to be worth over BF 130 million, rising to over BF 1 billion by 1995. The Benelux market has experienced fast growth since 1989. The estimated size and growth rate of 52% of the Benelux market is illustrated in Exhibit V-16. The leading Benelux EDI Software and Services vendors are included as Exhibit VI-17.

In January 1989 the Dutch PTT was spun off into a private company, PTT Nederland BV, whose shares are held by the state and which competes with the private sector. It was at the same time split into two subsidiaries, one for the postal service and one for telecommunications. The PTT telecommunications authority (PTT Telecom BV) will retain a monopoly on the infrastructure, but will lose its monopoly on equipment and services, meaning that it will be competing with the private sector.

PTT Telecom BV is structured into five divisions covering:

- National public network and leased lines.
- International communications.
- Consumer market products and services, primarily for domestic telephone sets.
- Communication equipment for business - PBX, fax, etc.
- Telematics systems and services.

The fifth division has responsibility for managing, developing and marketing VANS in the Netherlands in competition with, but also complementing, the private VANS suppliers. Its brief includes consultancy, turnkey systems and software development.

The network services market in the Netherlands is well developed, with the existing mobile, text and image VANS all run by PTT Telekom in competition with private companies. There are several private videotex networks in the Netherlands, and services such as telebanking and cash management services are also marketed. The EDI sector in particular is extremely active.

PTT Telecom is one of the three PTT partners in the EUCOM joint venture with the French and German PTTs.

Exhibit VI-18 lists some Dutch EDI service providers.

EXHIBIT VI-16

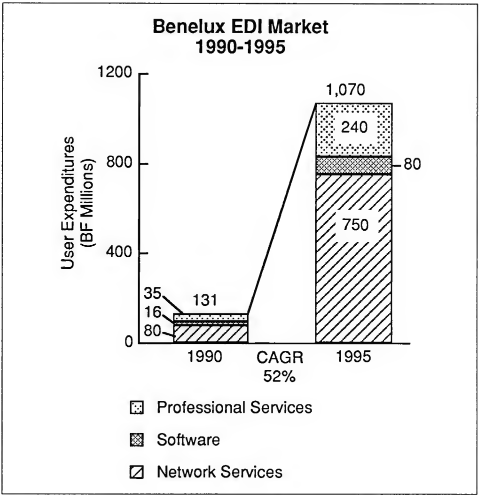


EXHIBIT VI-17

Leading EDI Software and Services Vendors, 1990—Benelux

Rank	Vendor	1990 Anticipated EDI Revenues (BF Millions)	Market Share * (Percent)
1	GEIS	54	41
2	IBM	24	18
3	Philips	15	12
4	GSI	9	7
5	EDS	7	5
6	SD-Scicon	6	5
7	GLI	6	4.4
8	Banque General de Belgique	3	3.5
9	Digital	3	2
10	Hewlett-Packard	2	2
	Others	2	2
	Total Market	131	100

* Note: May not add to 100% due to rounding

Telecommunications services in Belgium are provided by the Regie des Telegraphes et Telephones (RTT), which has a monopoly over basic conveyance of voice data. In the area of network services an increasing degree of competition is permitted, with several private companies active in the provision of videotex services. Alongside the private competition, the RTT plays an important role in the provision of value-added services with EFT, EFTPOS, teletex and videotex services all quite well developed.

Belgium's telecommunications industry has been undergoing radical changes; previously tightly regulated, the country is now under pressure to defend its network against the threat posed by the large operators in France and Germany and fears that they might take a big share of Belgian network traffic. Deregulation here means an end to the duopoly that has traditionally supplied Belgium's telecommunications and networks, comprising Antwerp-based Bell Telephone and Stea, the local subsidiary of a joint venture between Siemens and GTE of the USA. Vendors had been pushing for the establishment of a separate, independent body to

monitor the RTT's behaviour and to control equipment type approval, which is currently the RTT's preserve. This organisation - the National Standards and Authorisation Institute:

- Issues licences for private companies to provide services on leased lines.

- Exercises a control over tariffs.

2. Network Services

Exhibit VI-18 lists some of the important EDI projects in the Netherlands which is currently one of the most active countries in Europe in EDI take-up.

Philips is marketing a range of EDI products and services, targeting Netherlands-based transport companies, and has been closely involved in the design of EDI structured message formats, including EDIFACT.

Philips markets a range of EDI hardware and software products under the brand name, PHAME (standing for Philips Advanced Means of EDI). The product range is designed to meet all of a company's EDI needs, i.e: computer systems, application design, software packages, interface design between standard formats and network installation. Philips' initial focus is (similarly to Digital and Hewlett-Packard) on establishing bridges between users' internal EDI systems and external communities such as INTIS, the EDI network for the Port of Rotterdam, or Transpotel, the network of European freight companies.

The market for EDI services in Belgium is influenced by its position as a European economic centre as well as the headquarters for various government bodies, multinational corporations and financial institutions including SWIFT, the electronic funds transfer network. SWIFT is at the centre of discussions for bringing its EFT activities over the next four years into line with the EDIFACT standards (see INPUT's companion report, *Financial Network Services Western Europe, 1990-1995.*

EXHIBIT VI-18

EDI Services in the Netherlands

Name of Service/ Association	Sector	Service Provider
ADN	Insurance	GEIS
Cargonaut	Air Cargo	PTT Telekom
DCS	Car Dealers	EDS
CEFIC	Chemicals	GEIS
GBA	Public Sector	GEIS
INTIS	Transport	PTT, IBM, GEIS
OSIDES	General	PTT Telekom
Segitta	Customs	PTT Telekom
Transnet	Distribution	GEIS
Transpotel	Freight	IBM

H

Spain

The Spanish market for EDI software and services is anticipated to be worth 66 million pesetas in 1990, rising to over 1,300 million pesetas by 1995. Spain starts from a small base but it grows faster than any other European EDI market i.e: at a CAGR of 83% pa. The estimated size and growth of the Spanish market is shown in Exhibit VI-19. The leading Spanish EDI Software and Services vendors are included as Exhibit VI-20.

Spain is one of the few European countries in which telecommunications services are provided by a private organisation with a regulated monopoly position. The Company Telefonica Nacionale de Espana (CTNE - known familiarly as Telefonica) provides telephone, data transmission and new "telematic" services in addition to manufacturing and supplying telecommunication equipment. Equipment at one time could only be provided by two major equipment companies in whom Telefonica has shareholdings, Standard Electrica (now part of Alcatel) and Intelsa (once a joint holding with Telettra of Italy, now still partly owned by Telefonica but through a holding in the Italian parent).

The overall monopoly position has now been loosened and Telefonica has broadened its supplier base in recent years in a desperate attempt to improve the infrastructure which has been justifiably criticised for the

quality of its service. A key relationship with AT&T has been established with an eye to introducing ISDN technology into Spain's service portfolio.

Telefonica still has a monopoly over the provision of all services except telex, which is provided by the state itself. While development of public network services in Spain has been slow, Telefonica invested around $5 billion in 1989 alone for network and service upgrades.

Spain is supporting the ODETTE programme set in train by European motor manufacturers to promote the use of EDI in the automotive sector. This involves the car manufacturers within the Association of Spanish Car & Lorry Manufacturers and a large number of suppliers, working in collaboration with Telefonica, Entel, APD, IBM Spain and Madrid Industrial Engineers.

For the Spanish Ministry of Industry this idea of incorporating new technology into the production process as an effort to improve the nation's competitiveness is just one example of what it would like to achieve in other sectors in manufacturing and services.

EXHIBIT VI-19

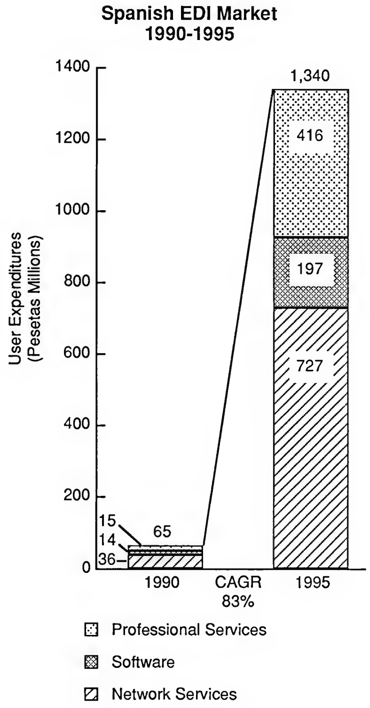


EXHIBIT VI-20

Leading EDI Software and Services Vendors, 1990 Spain

Rank	Vendor	1990 Anticipated EDI Revenues (Pta Millions)	Market Share (Percent)
1	GEIS	27	41
2	IBM	20	31
3=	EDS	4	6
3=	Hewlett-Packard	4	6
5	Digital	3	5
	Others	7	11
Total Market		65	100

I

Rest of Europe

The market for EDI software and services in 1990 in the rest of Western Europe is estimated to be worth $0.7 million. Growing at a CAGR of 75% per annum this figure will rise to $9 million by 1995. The estimated size and growth of the market is shown in Exhibit VI-21. The leading vendors of EDI Software and Services vendors in the rest of Western Europe are included as Exhibit VI-22.

The main two countries involved in this group are Switzerland and Austria. Ireland, Portugal and Greece are also included, but these are all small markets.

EXHIBIT VI-21

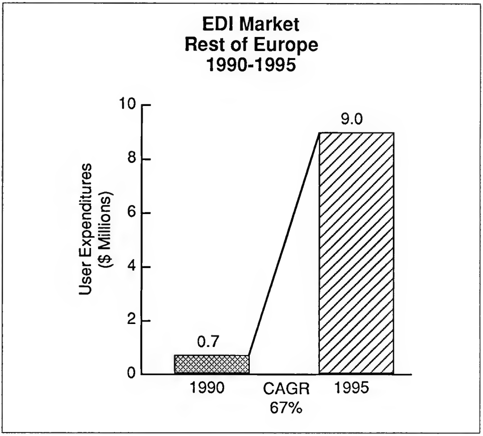


EXHIBIT VI-22

Leading EDI Software and Services Vendors 1990—Rest of Europe

Rank	Vendor	1990 Anticipated EDI Revenues ($ Millions)	Market Share* (Percent)
1	GEIS	0.21	31
2	IBM	0.17	25
3	Hewlett-Packard	0.14	20
	Others	0.16	24
	Total Market	0.68	100

VII

EDI Today

VII

EDI Today

The concept of EDI is as old as digital computers. Systems for the exchange of machine-readable data between companies were first used in the late 1950's (by airlines and airplane parts manufacturers). Today, a common name and terminology for this application has become accepted throughout the world, and institutions to set and maintain standards have been firmly established to allow EDI users and vendors to develop EDI further. A rich infrastructure of software, hardware, and service offerings has sprung up to allow for easy, off-the-shelf implementation of EDI. What started out as isolated efforts of data exchange is maturing into a self-propagating process. A critical mass has been attained in the USA; and the same point is fast approaching in Europe.

Yet EDI has by no means completely matured; much evolution is still to come. Establishing a common name and forum for development is just the beginning - it is the laying of the foundation. Now, having passed this critical incubation period, we are in a new phase of EDI development. In this phase the competitive implications of EDI are identified. This report intends to initiate the conversation on this issue - in so far as it affects Europe and the dealings between European organisations and those on other continents.

A

Reasons for Using EDI

The traditional and principal rationale for EDI starts with eliminating paperwork and its accompanying clerical labor costs. The traditional ways of preparing and managing business documents have several problems:

- Paper or verbal information is not directly usable by computers, nor, for that matter, is information transferred by facsimile.

- Telephone ordering and order-taking is labor intensive and error prone.

- Reliance on the mail slows turnaround time. Couriers are very expensive.

Many companies hold safety stocks of raw-material and finished-product inventories. This expedites product flow and improves customer service, but it requires capital, incurs the cost of capital, and thus erodes profit margins. Competitive pressures today have companies looking for ways to cut inventory holding costs and work toward just-in-time manufacturing environments.

EDI has been proven to save firms money. Interviewed users who have analyzed their paper and electronic costs report that EDI transactions cost one-tenth what the equivalent paper document costs.

- A single, fully cost burdened paper purchase order would cost $50, whereas a single, fully burdened EDI purchase order would cost on the order of two to five dollars.

Exhibit VII-1 lists the traditional benefits of EDI.

Although reducing the costs associated with paper document processing is the overt objective of EDI, the benefits of EDI extend beyond this. Indeed, mimicking the paper process with an electronic one often provides the company with marginal benefits. Duplicating the same procedures in an automated system will miss taking advantage of efficiencies that are inherent in electronic information/communication systems. Taking advantage of these efficiencies:

- Requires re-examining work flows within the company, and between the company and its trading partners.

- Requires looking at the assets and core competencies of the company.

- Requires considering the strategic objectives of the company and incorporating them into systems.

- Integrating EDI most effectively requires rethinking the organization.

This report looks at this issue.

EXHIBIT VII-1

The Benefits of EDI

- Data Keying—EDI reduces or eliminates redundant data entry.
- Errors—EDI, by reducing transcription and rekeying, eliminates keying errors, eliminates human interpretation/classification errors, and eliminates filing errors and lost documents.
- Filing—EDI replaces paper document filing with electronic files. It can eliminate the need for human filing and file retrieval, and thus reduce total space for computer files.
- Paper Forms—EDI reduces paper forms, especially multipart carbons going to many departments.
- Postage—EDI replaces mailed documents and their tracking and enveloping costs with data transmissions.
- Invoicing—EDI eliminates the need to invoice, since payment can be automatically triggered upon receipt of goods (evaluated receipt settlement).
- Payment—EDI can replace cheques with electronic payment.
- Accounts Receivable—EDI automates the cash application function, improves control, and eliminates the billing/invoicing function again via evaluated receipt settlement.
- Accounts Payable—EDI automates the entire payment process, including payment and remittance creation; it eliminates invoice validation via evaluated receipt settlement.
- Inventory—EDI reduces order lead time and order confirmation delay; it facilitates just-in-time inventory and the maintenance of lower levels of inventory. It reduces out-of-stock situations and allows for better control overall.
- Customer Service—EDI allows for more responsiveness to customers and for direct sales connections. It encourages lasting relationships with customers.

Looking for the other benefits of EDI over and above the reduction of clerical work requires, additionally, the development of new systems evaluation and management criteria. EDI benefits can be measured by many criteria:

- New services.
- Speed of communication.
- Low inventories.
- Reduced processing costs.
- Generation of new kinds of strategic information.
- Better integration of departments etc.

Corporate strategy and focus, again, is critical in determining the criteria for evaluating the costs and benefits of EDI. Exhibit VII-2 shows a more systematic approach to evaluating the benefits of EDI, by providing alternative criteria for evaluation, which can be used singly or in combination according to their suitability to a given management situation.

EDI enables management to change corporate strategy. Initially it promises expedited processing of routine paper documents - a cost-reducing tactic. Yet, once implemented, the user company may find itself on a new footing with new possibilities in terms of product offerings and enhancements, new organizations of its people, new relationships with trading partners, and new markets - in short, new strategic possibilities.

EDI enables companies to transform themselves. This can be seen in the way EDI has evolved over the last three decades.

EXHIBIT VII-2

EDI's Benefits Can Be Measured According to Different Standards of Value

	Maximisation of Assets	Reduction in Time Taken	Improved Coordination
Relevant Metrics	• ROI • Productivity • Capacity utilization • Assets include: - inventories - cash - people - physical plant	Reduction of cycle time periods: • Receiving trading partner acknowledgment of message received • Receiving/delivering product • Inventory turns	• Error counts • Product quality • Service levels • Customer satisfaction • Trading partner relationships • Product design effectiveness • Inventory levels
Drawbacks of Approach	Hard to distinguish EDI contribution	Doesn't reflect all the benefits	Hard to measure quantitatively
Benefits of Approach	Accepted by management; easiest way to identify advantages	Captures the thrust of EDI	Captures the thrust of EDI

B

History of EDI

The automatic passing of information related to commercial transactions has evolved over the past 30 years. The prototypical systems of today's EDI have originated in different sources:

- Airline parts systems.
- The transportation industry.
- Pharmaceuticals distribution.
- Grocery and other retail sectors.

The widespread use and publicity of EDI has produced an environment in which a company can expect either to have a trading partner request that it use EDI, to see a competitor using EDI, or both. EDI, like the telephone or facsimile machine, is becoming mandatory business equipment in some industries.

The standards of EDI are coalescing into a more or less single generic family (ANSI X12 and EDIFACT), with a variety of dialects for specific industry groups.

A single, international confederation of standards organizations and user groups is coalescing as well. The ANSI X12 organization, for example, is the conduit for North American EDI users to input and vote on UN EDIFACT standards. The people designing X12 and UN EDIFACT standards are the same.

The worldwide community of EDI users speaks a common lexicon of EDI terms: mapping, translation, data format, and hub company. The distinctions of EDI can be discussed between professional practitioners.

The infrastructure of standardized products and services greatly adds efficiency to the EDI market. Users have a wide choice of EDI software and network services in some cases too wide. Entry price points for EDI range from as low as in the USA to hundreds of thousands of dollars, depending on the volume of trade and the degree of integration a company wants to pursue. Off-the-shelf EDI implementations are possible, and interchangeable software is available. Systems integration options, where a company's entire supplier base is brought up on EDI, are provided by certain vendors today.

EDI is here today and it is not going away. It is firmly established. It has matured. It has attained a critical mass similar to the telephone - there are EDI users in almost every industry.

At this mature, consolidated stage, EDI evolution is entering a new phase of development. The issues are now:

- To what degree can EDI be integrated into a company, and thereby, integrate companies in a value chain?
- Is it desirable to have all trading partners conducting EDI and, if so, how is this possible and how is it to be financed?
- What are the strategic implications of EDI when the competitive environment (the organizational and industrial structures by and in which a company competes) is altered by EDI? What activities should a company concentrate on and what should be outsourced? Related to this, how much of the electronic network should a company own and operate versus how much should be left to a third party or trading partner?

Exhibit VII-3 summarizes today's issues in EDI.

EXHIBIT VII-3

Today's Issues in EDI

- Integration to what degree inside a company?
- Desirable to have all trading partners on EDI? If so, how to finance it?
- What are the strategic implications of EDI when the competitive environment is altered by EDI?

C

EDI in 1990

EDI has proliferated to all major sectors of the U.S. and to a number of important sectors in the European, and Pacific Rim economies. In many countries today, flourishing applications of EDI can be found. Governments are finding EDI invaluable in reducing the paperwork involved in procurement, customs, taxation, military operations, and others.

Exhibits VII-4 and VII-5 are EDI input-output matrices showing the current penetration of EDI applications throughout the world economy. Exhibit VII-4 lists EDI applications within and among 14 basic vertical markets. Exhibit VII-5 lists applications in specific industries within the manufacturing and distribution sectors. The charts should be used with the following techniques:

- Read down columns to read EDI performed with a particular vertical market's suppliers.
- Read across rows to read EDI performed with a particular vertical market's customers.

EDI is indisputably a viable technology for business. It has its own worldwide institutions. It is well established in business and becoming more so daily. Today, EDI:

- Has a common definition.
- Has two basic syntaxes (ANSI X12 and EDIFACT) recognised throughout the world, which are essentially compatible.
- Is used widely around the world by tens of thousands of companies.
- Is growing in use over 20% per year on a worldwide basis.

- Has a formal worldwide organization for the development and maintenance of EDI message standards (a single organization of interlinked national and industry standards bodies).
- Has a rich infrastructure of software and services, with inexpensive standardized products bringing the entry-level EDI costs within reach of just about any company.

EDI Input-Output Matrix

INDUSTRIES AS BUYERS →

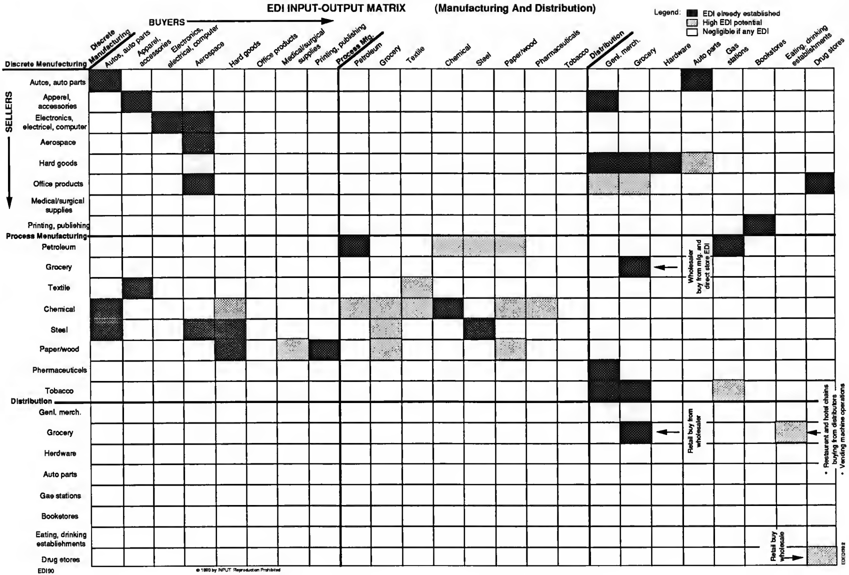
INDUSTRIES AS SELLERS ↓

Cells contain: • Significant EDI projects • Dominant uses of EDI
• The degree of EDI standards development (low, medium, high)

	Discrete Manufacturing	Process Manufacturing	Distribution	Transportation	Utilities	Communications	Banking	Insurance	Government	Agriculture	Construction	Education	Health care	Services
Discrete Manufacturing				• Spec 2000 • Transnet	• Electrical equipment				• CALS • Vendor Express • GSA		(Infancy) • Fittings, valves, parts, electrical supplies	• Book buying (Pubnet)	• Medical/ surgical supplies	
Process Manufacturing		See Expanded Matrix		• Spec 2000 (fuels)	• Fuels				• USMC commissaries • GSA	• Fertilizers			• Pharmaceutical supplies	
Distribution (Retail/Wholesale)										(Infancy) • Invoice prcssng • No purchase order potential	• Contractors buy materials and tools			
Transportation	(High)	(High)	(High)	• Intermodal handoffs • RR handoffs • CLMs	(Infancy)	• Film distribution			• USMC transport program					• Travel agents buy airline services
Utilities			Franchise site power billing	RR crossing billing		• Billboard power billing								
Communications	Phone billing	(all industries) →				• Film dist. data between theaters & distributors								
Banking (Financial EDI Services)	• GM pays suppliers • Lock box • Cash mgmt. • EFT pymnt svc	(all industries) →	• Factoring svcs • Gas stations pay oil co.s • Retailers pay apparel makers	• Freight bill processing										
Insurance								• NEIC • IVANS						
Government	• EFT for corp. taxes	(all industries) →		• Customs • EPA										
Agriculture			• Farm co-ops • Dairies											
Construction		• Petrochemical, food processing, paper, pharmaceutical co.s buy construction services and facilities			• Utilities co.s buy new construction & renovation for facilities				• US military buys lrg. scale construction services		• Contractor-designer-subcontractor EDI			• Commercial real estate developer buy office bldg. construction
Education									• Student loan information • Veterans Administration			• Transcripts • College catalogs • Standardized test data		
Health care								• Health care providers submit health claims						
Services				• Freight forwarding • Customs brokering										Travel, tourism

EDI90

EDED301



EDI INPUT-OUTPUT MATRIX (Manufacturing And Distribution)

Legend:
■ EDI already established
▒ High EDI potential
☐ Negligible if any EDI

BUYERS →

SELLERS ↓

	Discrete Manufacturing								Process Mfg.								Distribution							
	Autos, auto parts	Apparel, accessories	Electronics, electrical, computer	Aerospace	Hard goods	Office products	Medical/surgical supplies	Printing, publishing	Petroleum	Grocery	Textile	Chemical	Steel	Paper/wood	Pharmaceuticals	Tobacco	Genl. merch.	Grocery	Hardware	Auto parts	Gas stations	Bookstores	Eating, drinking establishments	Drug stores
Discrete Manufacturing																								
Autos, auto parts	■																			■				
Apparel, accessories		■															■							
Electronics, electrical, computer			■	■																				
Aerospace				■																				
Hard goods																	■	■	■	▒				
Office products				■													▒	▒						■
Medical/surgical supplies																								
Printing, publishing																						■		
Process Manufacturing																								
Petroleum									■			▒	▒	▒							■			
Grocery																		■						
Textile		■									▒													
Chemical	■				▒				▒	▒	▒	■		▒	▒									
Steel	■			■	■					▒			■											
Paper/wood					■		▒	■		▒				▒										
Pharmaceuticals																	■							
Tobacco																	■	■			▒			
Distribution																								
Genl. merch.																								
Grocery																		■					▒	
Hardware																								
Auto parts																								
Gas stations																								
Bookstores																								
Eating, drinking establishments																								
Drug stores																								▒

Wholesaler buy from mfg. and direct store EDI ←

Retail buy from wholesaler ←

- Restaurant and hotel chains buying from distributors ←
- Vending machine operations

Retail buy wholesale →

EDI90

EDED992

Exhibit VII-6 examines how far EDI has come since its origins thirty years ago.

EDI has attained a critical mass of acceptance and use. Every major economic sector uses it. Companies can expect to conduct EDI with not just a narrow array of suppliers, but with the full spectrum of its trading partners: inventory suppliers, banks, government agencies, service providers such as advertisers, etc.

EXHIBIT VII-6

EDI Yesterday versus Today

Early EDI	Today
Few, scattered implementations	Pervasive in economy, in function, and in trading partner type. • Every major industry uses it (not just transport, manufacturing, and distribution but education, government, advertising, etc.) • A company can conduct EDI with a wide variety of trading partners.
Proprietary data formats	Two basic standards families whose organizations are tightly integrated
All applications custom developed	A rich infrastructure of competitively priced products and services.
No organization to support development	Many national and international organizations to support users and standards development.
EDI was unknown, hard to describe, and considered to be an idiosyncratic application	A common vocabulary and user/vendor community for EDI
Growth confined to hub & spoke clusters	Over 20% growth per year worldwide
Applied to specific corporate couplings	Multiple trading partner types are common using a single translator platform.

The issues today are how to integrate EDI into the internal systems of companies. INPUT estimates that as high as 85% of all companies that use EDI have not integrated the EDI translation software with applications. These companies are re-keying data to and from the translator and applications. The EDI computer that receives and sends transmissions is no more functional than a facsimile machine.

EDI integration is not a straightforward matter, however. Technically it can be complicated, but it is the business organization implications of integration that are vexing businesses as they approach EDI. The process of integrating EDI changes organizations. And, changed organizations require new features and capabilities from EDI systems. Thus, dialectically, EDI evolves, and in the process of evolution, both organizations and EDI change.

The history of EDI shows that EDI and the business environment evolve dialectically and iteratively. Effective EDI implementation and systems design is an ongoing process. EDI implementation requires experimentation and a management perspective that proactively looks for new opportunities.

Furthermore, history has shown that companies may start as EDI users and end up as EDI users and vendors. Management should be prepared to operate in the entire infrastructure of EDI: as user, as vendor, as participant in standards discussions, and as an entrant to a new service or product market. Playing with EDI leads to many opportunities, many of which are unforeseeable.

VIII

EDI In The 1990s

VIII

EDI In The 1990s

A

EDI Development Forces

Exhibit VIII-I shows the development forces behind EDI's growth; the existence of faster, cheaper networks is a key development force because of three major factors:

- Liberalisation of the public telecommunications networks across Europe.
- Blurring of the technological distinction between data processing, office automation, telecommunications and control systems technology through the common use of network orientated microprocessor based systems.
- The growing dependence and commitment to the network and the network "backbone" as a framework for conducting business.

For the financial and operating benefits of EDI to be realised, a critical mass of trading partners is crucial, for it is only when this stage is reached that the paper-based operations can be significantly reduced.

INPUT believes that multiple standards will not represent a significant impediment to national or international EDI. Standards supporting international trade are increasingly available, and the work of the UNECE and CCITT in the EDI area is proceeding fairly rapidly. Furthermore, systems will migrate slowly in to EDIFACT compatibility and X.400 will work to overcome incompatible hardware systems and to support internetwork communications.

Early adopters of EDI who have reaped the initial rewards of cost reduction are now creating new trading structures, which could result in both significant further cost benefits and an increased marketing flexibility.

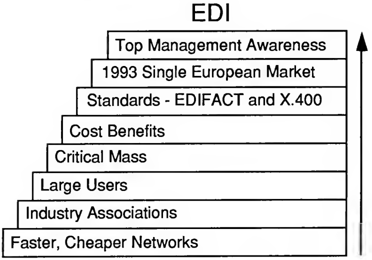
The existence of industry associations - which usually include one's competitors - means that organisations are working together to define the messages required, using whatever is available internationally in the way of syntax and message standards. This work is being carried out by development groups, within the different sectors of industry, and will continue to stimulate EDI growth.

EDI technology does not produce a business solution of itself. It is vital for top management to advocate and administer the organisational changes which are necessary. These can consist of:

- Changes to business and working practices.
- Changes to job functions and manning levels.
- Changes to organisational infrastructures and information flows.

EXHIBIT VIII-1

EDI Development Forces



INPUT believes strongly that whereas office automation could be said to have failed to fulfill much of the promise that surrounded its introduction and in no way impacted on an organisation's infrastructure, EDI - because it imports external influences and, more importantly, because it cuts across the boundaries between different internal functions and departments - is likely to have much greater success.

B

Vendor Recommendations

Organisations throughout Western Europe are becoming more aware of EDI and are coming to recognise, via vendor presentations, Government initiatives and user implementation case studies, the complexity inherent in the decision to adopt EDI. This complexity often means that it is beneficial and often essential to enhance or replace existing systems, or even to install complete new applications, in order to fully take advantage of EDI's speed and other improvements. Thus EDI impacts on the application development cycle and the adoption of CASE (Computer Assisted Software Engineering) strategies in large organisations.

As a result, there are an increasing number of opportunities for vendors to increase sales and to develop professional services portfolios. It is increasingly necessary in the next stage of EDI development for vendors to offer professional services in order to help with the process of integrating EDI with other applications and to overcome the inhibiting factor of an organisation's internal politics, since optimally EDI should:

- Be implemented with time across several functional areas.
- Become a factor in determining both the IT and the overall strategy of an organisation.

In order to offer a Professional Services EDI capability, vendors must either develop the necessary skills themselves or form alliances to bring the correct capabilities to bear on the marketplace. The trend should be towards offering a range of services up to and including the totally integrated EDI solution.

EDI software companies should be looking to ease the integration of EDI with other applications and planning for modular, integrated products that can be used throughout an organisation. In order to maximise the value of EDI throughout the users' organisation and trading group, such products should encompass a range of related network services applications, e.g.: electronic funds transfer, electronic forms processing and EDI-generated databases. INPUT's vendor recommendations are summarised in Exhibit VIII-2.

EXHIBIT VIII-2

EDI Vendor Recommendations

- Integrate with related applications
- Offer professional services solution
- Assess impact on AD cycle
- Overcome internal politics
- Address multiple functional areas
- Integrate with EFT
- Develop EDI databases

C

User Recommendations

EDI is vital to any organisation that wishes to remain competitive in the Single European market which is no more than two years away. Companies should be looking to assess the commercial implications of EDI and identifying their window of opportunity for EDI implementation.

For example, users must become aware that EDI can:

- Enable an organisation to cut out some of the intermediaries which stand between them and their dealing with customers and suppliers.
- Open up the opportunity to sell existing goods and services in different ways and possibly to wider markets.
- Reduce costs and improve efficiency.
- Improve information flow.
- Be used to offer new services.

One of the more difficult steps is in the identification of the most suitable approach to the introduction of EDI. It is important to highlight the key applications, according to their potential impact on the overall business. The choice of approach is intimately linked to the organisation's commercial reasons for using EDI. For example, if a company is seeking to gain competitive advantage, then it could well have to take the initiative in providing an EDI service for its industry.

Other key decisions concern the choice of methodology, i.e: whether to subscribe to a network service operated by a third-party provider or whether to attempt to set up direct links with trading partners or how to define a suitable mix of their methods. This type of decision should not merely be based on a question of cost and service, but also on the control in the sector that the service operator exerts and in the confidence felt in the security of external services.

Another key decision concerns the choice of message standards. Despite the progress being made with EDIFACT, there is still a justification for adopting either national (TRADACOMS in the UK, for example) standards or industry-specific (e.g., ODETTE) standards. The rationale ought to be that if the application has a strong commercial justification, then there is no point in delaying simply on account of lack of standards.

One of the major criticisms levelled by vendors at the user community is that user organisations are not prepared for EDI, or rather, they have not adequately prepared themselves. A considerable amount of internal preparation is required for EDI:

- Changes to the existing systems.
- Changes in documentation.
- Changes to strategic thinking at different levels.

To manage this change, the appointment of an internal EDI manager is vital for the success of the implementation. INPUT's user recommendations are summarised in Exhibit VIII-3.

EXHIBIT VIII-3

EDI User Recommendations

- Identify most suitable approach
- Highlight key applications
- Decide on methodology
- Adopt most appropriate standards
- Install "EDI manager"
- Institute regular reviews

Appendixes

A

Glossary of EDI Terms

ABI	Automated Broker Interface.
ACH	Automated Clearing-house.
ACP 90	Air Cargo Processing in the Nineties.
AECMA	Association Européene des Constructeurs de Matériel Aerospatiale
AGHA	Antwerp Port Community
ANA	Article Numbering Association
ANSI	American National Standards Institute
APACS	Association of Payment and Clearing Services
ASTI	Association des Services Transports Informatiques
ATM	Automatic Teller Machine
BACS	Bankers Automated Clearing Service
BDI	Batch Data Interchange
BEDIS	Booktrade Electronic Data Interchange Standards
CAD/CAM	Computer Aided Design/Computer Aided Manufacturing
CADDIA	Cooperation in the Automation of Data and Documentation for Imports/Exports in Agriculture
CASE	Common Application Service Elements
CCITT	Comité Consultatif International Télégraphique et Téléphonique
CEFIC	Conseil Européen des Fédérations de l'Industrie Chimique
CEPT	Committee of European Postal and Telecommunications Administrations
DISH	Data Interchange for Shipping
EAN	International Article Numbering Association
EBDI	Electronic Business Data Interchange
ECU	European Currency Unit
EDI	Electronic Data Interchange

EDIA	Electronic Data Interchange Association
EDICON	Electronic Data Interchange in Construction
EDIFACT	Electronic Data Interchange for Administration, Commerce and Transport
EDIFICE	Electronic Data Interchange Forum for Companies Interested in Computing and Electronics
EDIMS	Electronic Data Interchange Messaging System
EFT	Electronic Funds Transfer
EFTPOS	Electronic Funds Transfer at Point of Sale
EP	Electronic Publishing
EPOS	Electronic Point of Sale
ETDI	Electronic Trade Data Interchange
FTAM	File Transfer Access and Management
IGES	International Graphics Exchange Specification
INTIS	International Transport Information System
JEDI	Joint Electronic Data Interchange
JIT	Just-in-Time
LACES	London Airport Cargo EDP System
LDI	Logistics Data Interchange
MDN	Managed Data Network
MDNS	Managed Data Network Service
MCP	Maritime Cargo Processing
MOTIS	Message Orientated Text Interchange System
NAPLP	North American Presentation Layer Protocol
ODETTE	Organisation for Data Exchange by Teletransmission in Europe
OFTEL	Office of Telecommunications (UK)
OFTP	Odette File Transfer Protocol
PACE	Ports Automated Cargo Environment
PDN	Public Data Network
PSS	Packet Switch Service
PSTN	Public Switched Telephone Network
PTT	Postal, Telegraph and Telephone Administration
PVS	Private Videotex System
SEAGHA	Systems Electronic and Adapted Data Interchange in the Port of Antwerp
SITA	Society of International Airline Telecommunications
SITPRO	Simplification of International Trade Procedures Board
SMMT	Society of Motor Manufacturers and Traders
SOFI	Systeme d'Ordinateurs pour le traitement de Fret International
SWIFT	Society for World Interbank Financial Telecommunications
TDCC	Transportation Data Coordinating Committee
TDI	Trade Data Interchange

TEDIS	Travel Industry System Standards Group
TRADACOMS	Trading Data Communications Standard
TS	Transaction Services
TUA	Telecommunications Users Association
UNECE	United Nations Economic Commission for Europe
UNICORN	United Nations Interactive (message) Concept Over Reservation Networks
UNJEDI	United Nations Joint EDI Committee
UNTDED	United Nations Trade Data Elements Directory
UNTDI	United Nations Trade Data Interchange
VADS	Value Added and Data Services
VANS	Value Added Network Services
VDA	German Automotive Trade Associations
X12	Generic EDI standards approved by the American Standards Committee
X.25	International standard formulated by CCITT for assembling and transmitting data in a packet switched network
X.400	International electronic messaging standard recommended by the CCITT

B

U.S. Dollar and ECU Exchange Rates 1990

EXHIBIT B-1

U.S. Dollar and ECU Exchange Rates, 1990

Country	Currency	U.S. Dollar Exchange Rate	ECU Exchange Rate
France	FF	6.17	6.87
Germany	DM	1.81	2.05
United Kingdom	£	0.631	0.74
Italy	Lira	1,336.0	1,502.0
Sweden	Sek	6.39	7.41
Denmark	DK	7.05	7.8
Norway	NK	6.85	7.94
Finland	FM	4.21	4.84
Netherlands	Dfl	2.05	2.3
Belgium	BF	38.06	42.29
Switzerland	SF	1.61	1.8
Austria	Sch	12.77	14.39
Spain	Ptas	115.8	129.7
Rest of Europe	$	1.0	0.83

EXHIBIT B-2

Inflation Assumptions

Country	Assumption 1989-1994	Assumption 1990-1995	Change
France	4	4.5	+0.5
Germany	2.5	4	+1.5
United Kingdom	5.5	7	+1.5
Italy	6	7	+1.0
Sweden	6	7	+1.0
Denmark	6	5	-1.0
Norway	4	5	+1.0
Finland	6	6	0.0
Netherlands	2	3	+1.0
Belgium	3.5	4	+0.5
Switzerland	2.5	5	+2.5
Austria	3	4	+1.0
Spain	5.5	6.5	+1.0
Rest of Europe	8	10.0	+2.0
European Average	4.5	5.5	+1.0

C

Definitions of Terms

A

Overall Definitions and Analytical Framework

Information Services - Computer/telecommunications-related products and services that are oriented toward the development or use of information systems. Information services typically involve one or more of the following:

- Processing of specific applications using vendor-provided systems (called **Processing Services**)
- A combination of hardware, packaged software and associated support services which will meet a specific application processing need (called **Turnkey Systems**)
- Packaged software (called **Software Products**)
- People services that support users in developing and operating their own information systems (called **Professional Services**)
- Bundled combinations of products and services where the vendor assumes responsibility for the development of a custom solution to an information system problem (called **Systems Integration**)
- Services that provide operation and management of all or a significant part of a user's information systems functions under a long-term contract (called **Systems Operations**)
- Services associated with the delivery of information in electronic form-typically network-oriented services such as value-added networks, electronic mail and document interchange, on-line data bases, on-line news and data feeds, videotex, etc. (called **Network Services**)

In general, the market for information services does not involve providing equipment to users. The exception is where the equipment is bundled as part of an overall service offering such as a turnkey system, a systems operations contract, or a systems integration project.

The information services market also excludes pure data transport services (i.e., data or voice communications circuits). However, where information transport is associated with a network-based service (e.g., EDI or VAN services), or cannot be feasibly separated from other bundled services (e.g., some systems operations contracts), the transport costs are included as part of the services market.

The analytical framework of the **Information Services Industry** consists of the following interacting factors: overall and industry-specific business environment (trends, events and issues); technology environment; user information system requirements; size and structure of information services markets; vendors and their products, services and revenues; distribution channels, and competitive issues.

All **Information Services Market** forecasts are estimates of **User Expenditures** for information services. When questions arise about the proper place to count these expenditures, INPUT addresses them from the user's viewpoint: expenditures are categorized according to what users perceive they are buying.

By focusing on user expenditures, INPUT avoids two problems which are related to the distribution channels for various categories of services:

- Double counting, which can occur by estimating total vendor revenues when there is significant reselling within the industry (e.g., software sales to turnkey vendors for repackaging and resale to end users)

- Missed counting, which can occur when sales to end users go through indirect channels such as mail order retailers

Market Sectors or markets, are groupings or categories of the users who purchase information services. There are three types of user markets:

- *Vertical Industry* markets, such as Banking, Transportation, Utilities, etc.

- *Functional Application* markets, such as Human Resources, Accounting, etc. These are also called "Cross-Industry" markets.

- *Generic* markets, which are neither industry- nor application-specific, such as the market for systems software.

Specific market sectors used by INPUT are defined in Section D, below.

Captive Information Services User Expenditures are expenditures for products and services provided by a vendor that is part of the same parent corporation as the user. These expenditures are not included in INPUT forecasts.

Non-captive Information Services User Expenditures are expenditures that go to vendors which have a different parent corporation than the user. It is these expenditures which constitute the information services market.

Delivery Modes are defined as specific products and services that satisfy a given user need. While *Market Sectors* specify *who* the buyer is, *Delivery Modes* specify *what* the user is buying.

Of the eight delivery modes defined by INPUT, five are considered primary products or services:

- *Processing Services*
- *Network Services*
- *Professional Services*
- *Applications Software Products*
- *Systems Software Products*

The remaining three delivery modes represent combinations of these products and services, bundled together with equipment, management and/or other services:

- *Turnkey Systems*
- *Systems Operations*
- *Systems Integration*

Section B describes the delivery modes and their structure in more detail.

Outsourcing is defined as the contracting of information systems (IS) functions to outside vendors. Outsourcing should be viewed as the opposite of *insourcing*: anything that IS management has considered feasible to do internally (e.g., data center operations, applications development and maintenance, network management, training, etc.) is a potential candidate for outsourcing.

IS has always bought systems software, as it is infeasible for companies to develop it internally. However, all other delivery modes represent functions or products that IS management could choose to perform or develop in-house. Viewed this way, outsourcing is the result of a make-or-buy decision, and the outsourcing market covers any product or service where the vendor must compete against the client firm's own internal resources.

B

Industry Structure and Delivery Modes

1. Service Categories

The following exhibit presents the structure of the information services industry. Several of the delivery modes can be grouped into higher-level **Service Categories**, based on the kind of problem the user needs to solve. These categories are:

- **Business Application Solutions (BAS)** - prepackaged or standard solutions to common business applications. These applications can be either industry-specific (e.g., mortgage loan processing for a bank), cross-industry (e.g., payroll processing), or generic (e.g., utility time-sharing). In general, BAS services involve minimal customization by the vendor, and allow the user to handle a specific business application without having to develop or acquire a custom system or system resources. The following delivery modes are included under BAS:
  - *Processing Services*
  - *Applications Software Products*
  - *Turnkey Systems*
- **Systems Management Services (SMS)** - services which assist users in developing systems or operating/managing the information systems function. Two key elements of SMS are the customization of the service to each individual user and/or project, and the potential for the vendor to assume significant responsibility for management of at least a portion of the user's information systems function. The following delivery modes are included under SMS:
  - *Systems Operations*
  - *Systems Integration*

Each of the remaining three delivery modes represents a separate service category:

- *Professional Services*
- *Network Services*
- *System Software Products*

Note: These service categories are a new concept introduced in the 1990 MAP Program. They are purely an aggregation of lower level delivery mode data. They do not change the underlying delivery modes or industry structure.

2. Software Products

There are many similarities between the applications and systems software delivery modes. Both involve user purchases of software packages for in-house computer systems. Included are both lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's sites. Vendor-provided training or support in operation and use of the package, if bundled in the software pricing, is also included here.

Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself.

- Systems Software Products

Systems software products enable the computer/communications system to perform basic machine-oriented or user interface functions. These products include:

  - *Systems Control Products* - Software programs that function during application program execution to manage computer system resources and control the execution of the application program. These products include operating systems, emulators, network control, library control, windowing, access control, and spoolers.

  - *Operations Management Tools* - Software programs used by operations personnel to manage the computer system and/or network resources and personnel more effectively. Included are performance measurement, job accounting, computer operation scheduling, disk management utilities, and capacity management.

  - *Applications Development Tools* - Software programs used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Included are traditional programming languages, 4GLs, data dictionaries, data base management systems, report writers, project control systems, CASE systems and other development productivity aids. Also included are system utilities (e.g., sorts) which are directly invoked by an applications program.

- Application Software Products

  - *Industry-Specific Application Software Products* - Software products that perform functions related to solving business or organizational needs unique to a specific vertical market and sold to that market only. Examples include demand deposit accounting, MRPII, medical recordkeeping, automobile dealer parts inventory, etc.

- *Cross-Industry Application Software Products* - Software products that perform a specific function that is applicable to a wide range of industry sectors. Applications include payroll and human resource systems, accounting systems, word processing and graphics systems, spreadsheets, etc.

3. Turnkey Systems

A turnkey system is an integration of equipment (CPU, peripherals, etc.), systems software, and packaged or custom application software into a single system developed to meet a specific set of user requirements. Value added by the turnkey system vendor is primarily in the software and support services provided. Most CAD/CAM systems and many small business systems are turnkey systems. Turnkey systems utilize standard computers and do not include specialized hardware such as word processors, cash registers, process control systems, or embedded computer systems for military applications.

Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included the appropriate software category.

Most turnkey systems are sold through channels known as value-added resellers.

- *Value-Added Reseller (VAR):* A VAR adds value to computer hardware and/or software and then resells it to an end user. The major value added is usually application software for a vertical or cross-industry market, but also includes many of the other components of a turnkey systems solution, such as professional services.

Turnkey systems are divided into two categories.

- *Industry-Specific Systems* - systems that serve a specific function for a given industry sector, such as automobile dealer parts inventory, medical recordkeeping, or discrete manufacturing control systems.

- *Cross-Industry Systems* - systems that provide a specific function that is applicable to a wide range of industry sectors, such as financial planning systems, payroll systems, or personnel management systems.

4. Processing Services

This category includes transaction processing, utility processing, and other processing services.

- *Transaction Processing:* - Client uses vendor-provided information systems-including hardware, software and/or data networks-at vendor site or customer site, to process transactions and update client data bases. Transactions may be entered in one of four modes:
  - *Interactive* - Characterized by the interaction of the user with the system for data entry, transaction processing, problem solving and report preparation: the user is on-line to the programs/files stored on the vendor's system.
  - *Remote Batch* - Where the user transmits batches of transaction data to the vendor's system, allowing the vendor to schedule job execution according to overall client priorities and resource requirements.
  - *Distributed Services* - Where users maintain portions of an application data base and enter or process some transaction data at their own site, while also being connected through communications networks to the vendor's central systems for processing other parts of the application.
  - *Carry-in Batch* - Where users physically deliver work to a processing services vendor.
- *Utility Processing*: Vendor provides basic software tools (language compilers, assemblers, DBMSs, graphics packages, mathematical models, scientific library routines, etc.), generic applications programs and or data bases, enabling clients to develop their own programs or process data on vendor's system.
- *Other Processing Services*: Vendor provides services-usually at vendor site-such as scanning and other data entry services, laser printing, computer output microfilm (COM), CD preparation and other data output services, backup and disaster recovery, etc.

5. Systems Operations

Systems operations involves the operation and management of all or a significant part of the user's information systems functions under a long-term contract. These services can be provided in either of two distinct submodes:

- *Professional Services:* The vendor provides personnel to operate client-supplied equipment. Prior to 1990, this was a submode of the Professional Services delivery mode.

- *Processing Services:* The vendor provides personnel, equipment and (optionally) facilities. Prior to 1990, this was a submode of the Processing Services delivery mode.

In the federal government market the processing services submode is called "COCO" (Contractor-Owned, Contractor-Operated), and the professional services mode is referred to as "GOCO" (Government-Owned, Contractor-Operated).

Systems operations vendors now provide a wide variety of services in support of existing information systems. The vendor can plan, control, provide, operate, maintain and manage any or all components of the user's information systems (equipment, networks, systems and/or application software), either at the client's site or the vendor's site. Systems operations can also be referred to as "resource management" or "facilities management."

There are two general levels of systems operations:

- *Platform/network operations* - where the vendor operates the computer system and/or network without taking responsibility for the applications
- *Application operations* - where the vendor takes responsibility for the complete system, including equipment, associated telecommunications networks, and applications software

Note: Systems Operations is a new delivery mode introduced in the 1990 MAP Program. It was created by taking the Systems Operations submode out of both Processing Services and Professional Services. No other change has been made to the delivery mode definitions, and the total forecast expenditures for these three delivery modes are identical to the total forecast expenditures of the two original modes before the breakout of Systems Operations.

6. Systems Integration (SI)

Systems integration is a business offering that provides a complete solution to an information system, networking or automation requirement through the custom selection and implementation of a variety of information system products and services. A systems integrator is responsible for the overall management of a systems integration contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function, on schedule and at the contracted price.

To be included in the information services market, systems integration projects must involve some application processing component. In addition, the majority of cost must be associated with information systems products and/or services.

The systems integrator will perform, or manage others who perform, most or all of the following functions:

- Program management, including subcontractor management
- Needs analysis
- Specification development
- Conceptual and detailed systems design and architecture
- System component selection, modification, integration and customization
- Custom software design and development
- Custom hardware design and development
- Systems implementation, including testing, conversion and post-implementation evaluation and tuning
- Life cycle support, including
  - System documentation and user training
  - Systems operations during development
  - Systems maintenance
- Financing

7. Professional Services

This category includes consulting, education and training, and software development.

- *Consulting:* Services include management consulting (related to information systems), information systems consulting, feasibility analysis and cost-effectiveness studies, and project management assistance. Services may be related to any aspect of information systems, including equipment, software, networks and systems operations.

- *Education and Training:* Products and services related to information systems and services for the professional and end user, including computer-aided instruction, computer-based education, and vendor instruction of user personnel in operations, design, programming, and documentation.

- *Software Development:* Services include user requirements definition, systems design, contract programming, documentation and implementation of software performed on a custom basis. Conversion and maintenance services are also included.

8. Network Services

Network services typically include a wide variety of network-based functions and operations. Their common thread is that most of these functions could not be performed without network involvement. Network services is divided into two major segments: *Electronic Informa-*

tion Services, which involve selling information to the user, and *Network Applications,* which involve providing some form of enhanced transport service in support of a user's information processing needs.

- *Electronic Information Services*

Electronic information services are data bases that provide specific information via terminal- or computer-based inquiry, including items such as stock prices, legal precedents, economic indicators, periodical literature, medical diagnosis, airline schedules, automobile valuations, etc. The terminals used may be computers themselves, such as communications servers or personal computers. Users typically inquire into and extract information from the data bases. Although users may load extracted data into their own computer systems, the electronic information vendor provides no data processing or manipulation capability and the users cannot update the vendor's data bases.

The two kinds of electronic information services are:

- *On-line Data Bases* - Structured, primarily numerical data on economic and demographic trends, financial instruments, companies, products, materials, etc.
- *News Services* - Unstructured, primarily textual information on people, companies, events, etc.

While electronic information services have traditionally been delivered via networks, there is a growing trend toward the use of CD ROM optical disks to support or supplant on-line services, and these optical disk-based systems are included in the definition of this delivery mode.

- *Network Applications*
  - *Value-Added Network Services (VAN Services)* - VAN services are enhanced transport services which involve adding such functions as automatic error detection and correction, protocol conversion, and store-and-forward message switching to the provision of basic network circuits.

While VAN services were originally provided only by specialized VAN carriers (Tymnet, Telenet, etc.), today these services are also offered by traditional common carriers (AT&T, Sprint, etc.). Meanwhile, the VAN carriers have also branched into the traditional common carriers' markets and are offering unenhanced basic network circuits as well.

INPUT's market definition covers VAN services only, but includes the VAN revenues of all types of carriers.

- *Electronic Data Interchange (EDI)* - Application-to-application exchange of standardized business documents between trade partners or facilitators. This exchange is commonly performed using VAN services. Specialized translation software is typically employed to data from organizations' internal file formats to EDI interchange standards; this software may be provided as part of the VAN service, or may be resident on the organization's own computers.
- *Electronic Information Exchange (EIE)* - Also known as Electronic Mail (E-Mail), EIE involves the transmission of messages across an electronic network managed by a services vendor, including facsimile transmission (FAX), voice mail, voice messaging, and access to Telex, TWX, and other messaging services. This also includes bulletin board services.
- *Other Network Services* - This segment contains videotex and pure network management services. Videotex is actually more a delivery mode than an application. Its prime focus is on the individual as a consumer or in business. These services provide interactive access to data bases and offer the inquirer the capability to send as well as receive information for such purposes as home shopping, home banking, travel reservations, and more.

Network management services included here must involve the vendor's network and network management systems as well as people. People-only services, or services that involve the management of networks as part of the broader task of managing a user's information processing functions are included in Systems Operations.

C

Vendor Revenue and User Expenditure Conversion

The size of the information services market may be viewed from two perspectives: vendor (producer) revenues, and user expenditures. While the primary data for INPUT's research is vendor interviews, INPUT defines and forecasts the information services market in terms of end-user expenditures. End-user expenditures reflect the markup in producer sales when a product such as software is delivered through indirect distribution channels, such as original equipment manufacturers (OEMs), retailers and distributors. The focus on end-user expenditure also eliminates the double counting of revenues which would occur if sales were tabulated for both producer (e.g., Lotus) and distributor (e.g., BusinessLand).

For most delivery modes, vendor revenues and user expenditures are fairly close. However, there are some significant areas of difference. Many microcomputer software products, for example, are marketed through indirect distribution channels. To capture the valued added through these indirect distribution channels, adjustment factors which incorporate industry discount ratios are used to convert estimated information services vendor revenues to end-user expenditures.

For some delivery modes, including software products, systems integration and turnkey systems, there is a significant volume of intra-industry sales. For example, systems integrators purchase software and subcontract the services of other professional services vendors. And turnkey vendors incorporate purchased software into the systems which they sell to end users.

To account for such intra-industry transactions, INPUT uses other conversion ratios to derive the estimate of end-user expenditures.

The following table summarizes the net effect of the various ratios used by INPUT to convert vendor revenues to end-user expenditure (market size) figures for each delivery mode:

Delivery Mode	Vendor Revenue Multiplier
Application Software Products	1.18
Systems Software Products	1.10
Systems Operations	1.00
Systems Integration	0.99
Professional Services	0.99
Network Services	0.99
Processing Services	0.99
Turnkey Systems	0.95

D

Sector Definitions and Delivery Mode Reporting

1. Industry Sector Definitions (Vertical Markets)

INPUT has structured the information services market into 16 generic industry sectors, such as process manufacturing, insurance, transportation, etc. The definitions of these sectors are based on the 1987 revision of the Standard Industrial Classification (SIC) Code system. The specific industries (and their SIC Codes) included under these generic industry sectors are detailed in the attached table.

2. Cross-Industry Sector Definitions (Horizontal Markets)

In addition to these vertical industry sectors, INPUT has also identified seven cross-industry or horizontal market sectors. These sectors or markets involve multi-industry applications such as human resource systems, accounting systems, etc. In order to be included in an industry sector, the service or product delivered must be specific to that sector only. If a service or product is used in more than one industry sector, it is counted as cross-industry. The seven cross-industry markets are:

- *Human Resource Systems*

- *Education and Training*

- *Office Systems*
- *Accounting Systems*
- *Engineering and Scientific Applications*
- *Planning and Analysis Systems*
- *Other Applications (including telemarketing, sales management and electronic publishing)*

3. Delivery Mode Reporting by Sector

The tables below show how market forecasts for individual delivery modes are related to specific market sectors.

Vertical Market Sectors Only

The following delivery modes are reported by industry sector (vertical market) only:

Delivery Mode	Applicable Submodes
• Network Services:	Network Applications
• Systems Operations:	All
• Systems Integration:	All
• Professional Services:	All

This reporting structure is intended to provide expenditures by industry sector. However, it is recognized that many of the services provided are not necessarily specific or unique to any of the individual sectors.

Vertical and Cross-Industry Market Sectors

The following delivery modes are reported by industry sector and cross-industry sector (vertical and horizontal markets):

Delivery Mode	Applicable Submodes
• Processing Services:	Transaction Processing
• Software	Applications
• Turnkey Systems:	All

All of these delivery modes represent specific business application solutions.

Vertical and Generic Market Sectors

The following submode is reported both by industry sector (vertical market), and the generic market:

Delivery Mode	Applicable Submodes
• Network Services	Electronic Information Services

While some electronic information is industry-specific (e.g., farm crop reports), much of it is relevant to or may be used by any industry (e.g., data base services such as Dialog).

Generic Market Sector Only

The following delivery modes are so generic that they are not reported by industry or cross-industry sector (vertical or horizontal market):

Delivery Mode	Applicable Submodes
• Processing Services	Utility Processing Other Processing
• Software	Systems (All)